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Market Analysis and Planning Services (MAPS)

Information Services Industry Specific and Cross-Industry Markets

Volume 1

1987

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Market Analysis and Plannning Service (MAPS) Information Services Industry-Specific and Cross Industry Markets

1987
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[1] Planning and Analysis was delivered early in 1988 due to the Special Report requested by most clients.

Reports for Professional Services, Systems Software and Value Added Networks were covered in the separately bound blue books that comprise the annual reports for 1987.

Market
Analysis and
Planning
Services
(MAPS)

U.S. Information Services Industry-Specific and Cross-Industry Markets 1987-1992

Introduction

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DECEMBER 1987

U.S. INFORMATION SERVICES INDUSTRY-SPECIFIC AND CROSS-INDUSTRY MARKETS, 1987-1992

INTRODUCTION

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I

Introduction

The introduction for the MAPS program is produced as the initial pages for the entire program. The program in 1987 consisted of the following parts:

- The 1987 Market Data and Forecast Data Base updated through 1992.
- Individual reports on 14 industry-specific sectors and 6 cross-industry sectors in a two-volume set of 3-ring binders.
- Four annual reports on the delivery modes: Processing/Network Services, Software Products, Professional Services, and Turnkey Systems.
- Four major topic reports:
  - *CSI Implementations*
  - *On-Line Data Base Markets, 1987-1992*
  - *Network Integration, 1987-1992*
  - *Future DBMS Markets, 1987-1992*
- Hotline query service.

This introduction resides in the first volume of the MAPS binders and specifies the general aspects of the program in terms of purpose, scope, methodology, and market structure. In addition general forecast parameters are presented to provide the appropriate backdrop to using the information provided.

A

Purpose and Scope

The purpose of the MAPS report series is to provide insight and understanding concerning parameters that are shaping the Information Services industry.

The Information Services industry is discussed by segmenting the industry into four delivery modes:

- Processing/Network Services
- Software Products
- Professional Services
- Turnkey Systems

In addition the entire U.S. economy is segmented into 14 industry-specific and 6 cross-industry sectors. This segmentation is based on the U.S. Department of Commerce's SIC codes. (Note: These codes do not include the changes made in 1987.)

Each of the industry-specific markets is analyzed describing the events, issues, and trends occurring in that market. In addition a discussion on Information Services department budgets is offered to capture the specific buying patterns of said market.

In a similar fashion, cross-industry markets are analyzed to provide better understanding of market factors in the cross-industry segments. Exhibit I-1 shows the Information Services Industry Structure by delivery mode with the next level of detail under each delivery mode.

Exhibit I-2 shows the 14 industry-specific sectors and 6 cross-industry sectors covered by the MAPS program. Appendix A of Section II (Executive Overview) provides the entire Department of Commerce SIC codes at the two-digit level and explains how they map into the INPUT industry-specific segmentation.

Data captured, presented, and forecast is for user expenditures that are noncaptive and in the U.S.

The objectives of the reports in the MAPS program are to provide vendors in the Information Services industry the insight to:

- Identify emerging market opportunities
- Isolate high-growth areas
- Assist in the allocation of resources for marketing and research and development
- Determine windows of opportunity and means to maximize profitability

EXHIBIT I-1

INFORMATION SERVICES INDUSTRY STRUCTURE BY DELIVERY MODE

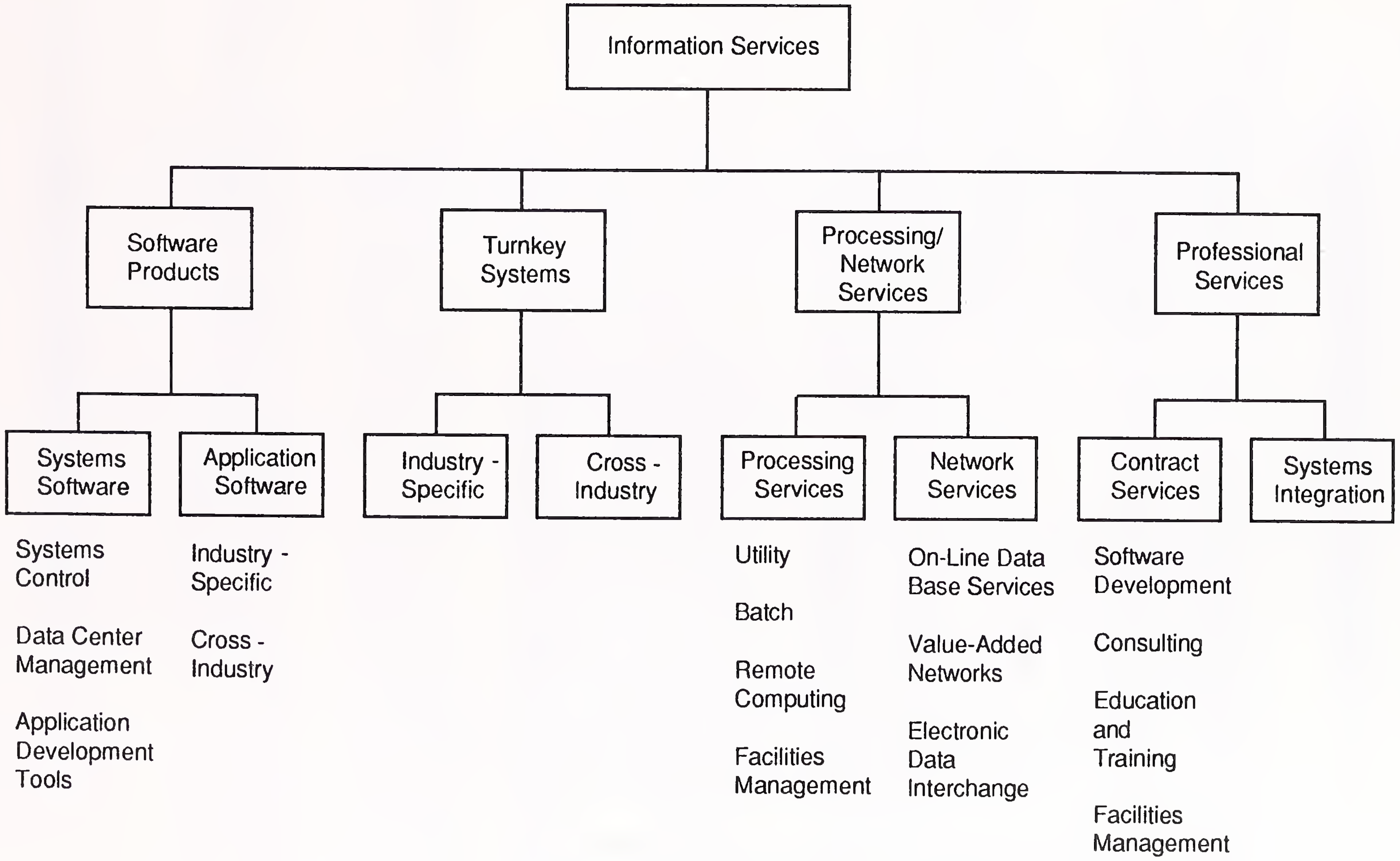
Information Services
Software Products
Turnkey Systems
Processing/ Network Services
Professional Services
Systems Software
Application Software
Industry - Specific
Cross - Industry
Processing Services
Network Services
Contract Services
Systems Integration
Systems Control
Data Center Management
Application Development Tools
Industry - Specific
Cross - Industry
Utility
Batch
Remote Computing
Facilities Management
On-Line Data Base Services
Value-Added Networks
Electronic Data Interchange
Software Development
Consulting
Education and Training
Facilities Management

EXHIBIT I-2

INFORMATION SERVICES MARKET STRUCTURE BY SEGMENTS

INDUSTRY-SPECIFIC SECTORS	CROSS-INDUSTRY SECTORS
Discrete Manufacturing	Planning and Analysis
Process Manufacturing	Accounting
Transportation	Human Resources
Utilities	Engineering and Scientific
Telecommunications	Education and Training
Distribution	"Other"
Banking and Finance	
Insurance	
Medical	
Education	
Services	
Federal Government	
State and Local Government	
"Other"	

B

Report Structure and Format

The MAPS forecast data base is provided in a two-volume set of 3-ring binders. Each 1987 report is 3-hole punched and saddle stitched for ease of use and removal.

The binders are organized as follows:

- Section I is the Introduction. This section provides general information to allow the reader to get maximum utility from the contents.

- Section II is an Executive Overview of the market size and directions for 1987.

- Section III is the Industry-Specific portion and provides an individual write-up covering market size, growth, and analysis for each industry sector.

- Section IV is the portion of the binders that covers the Cross-Industry sectors and provides the market size, growth, and sector analysis.

- Section V includes the market definitions, industry SIC code classification, market data base forecast, and the reconciliation for last year's (1986) forecast.

- Section VI is a discussion of INPUT's programs, services, and overall capabilities.

Exhibit I-3 shows the general outline for the industry-specific market sectors. The main difference between industry-specific market sectors and cross-industry market sectors is the inclusion of section IV in the industry-specific reports. This section describes the industry-specific (or vertical) budget outlook.

C

Forecast Methodology

The information for these industry-specific and cross-industry reports and the forecast data are obtained from INPUT's continuous process of monitoring the Information Services market. There are two fundamental and complementary approaches of primary research:

- Formal and informal interviews with decision makers of companies who are purchasers of information services in each of the reported industries.

- Ongoing census monitoring of all vendors in the information services industry whose revenues exceed $7 million. In addition stratified random-sampling techniques are employed to estimate the size and number of companies smaller than $7 million.

These approaches are augmented by secondary research in the form of monitoring of major periodicals that cover the business industry as well as segments of the information services industry. Relevant information is captured, sorted by an industry classification scheme and filed for later review.

In addition some 3,700 vendors are followed and pertinent information is captured on issues, events, and press release information.

EXHIBIT I-3

SECTION FORMAT
INDUSTRY-SPECIFIC/CROSS-INDUSTRY

I. ISSUES, TRENDS, AND EVENTS

- Discussion of the industry-specific segment being analyzed relative to business, technology, and market factors affecting the segment.

II. MARKET FORECASTS

- Presentation of the size and growth of the industry-specific segment being analyzed.

III. COMPETITIVE DEVELOPMENTS

- Discussion of specific competitive issues affecting the industry-specific segment.

- Presentation of profiles of major vendors participating in the industry-specific segment.

IV. INFORMATION SYSTEMS DEPARTMENT OUTLOOK

- Discussion of the industry-specific segment in terms of the users' perspective.

V. OPPORTUNITIES

- Indentification of special niches or other opportunities within the industry-specific segment.

VI. CONCLUSIONS AND RECOMMENDATIONS

- Presentation of the major findings and INPUT's recommendations for client action within the industry-specific segment.

This information is continuously added to the INPUT data base. The vendor performance and trends of the previous year are analyzed, and user expenditure information obtained from IS managers is evaluated. Forecasts are then generated for the next year and the ensuing five years. (This year is taken as 1987, and the ensuing five years would be through 1992.)

Forecast numbers presented in all INPUT reports are in current dollars. This means the forecast is in the dollars of that year. INPUT has used the GNP and GNP deflator (inflation) assumptions used in Exhibit I-4. Note that the source for INPUT's assumptions is the U.S. Department of Commerce. For the reader's reference, the GNP deflators (inflation) used last year are shown. The inflation forecast has been lowered in the past year.

Each delivery mode of information services has a different factor used as a proportion of the annual inflation rate for labor content. The factors used are shown in the table below:

Delivery Mode	Labor Content Factor
Processing Services	70%
Software Products	80%
Professional Services	100%
Turnkey Systems	40%

INPUT's forecasts are based on a fairly steady growth in real GNP—in the 3+% to 4+% range. No provision is made for a recession or a period of rapid or sudden expansion. (Note: This section was written after the so-called "stock market crash" of October 19, 1987. INPUT has written a special report on the impact of the world stock market decline—our report concluded that no change in the forecast is currently warranted.)

INPUT welcomes questions and/or comments regarding the forecasts and any other information, data, or issues that are covered by the reports. It is INPUT's desire to provide meaningful interaction and dialogue to maximize our effectiveness for our clients.

EXHIBIT I-4

INPUT INFLATION AND GNP ASSUMPTIONS

YEAR	NOMINAL GNP (Percent)	1987 REPORT GNP DEFLATOR (INFLATION RATE)	REAL GNP (Percent)	1986 REPORT GNP DEFLATOR
1987	6.1	3.3	2.8	5.0
1988	7.5	4.1	3.4	6.0
1989	6.9	3.0	3.9	6.0
1990	6.6	3.0	3.6	6.0
1991	5.5	2.0	3.5	6.0
1992	5.4	2.0	3.4	-

Source: U.S. Department of Commerce

About INPUT

INPUT provides planning information, analysis and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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(MAPS)

U.S. Information Services Industry-Specific and Cross-Industry Markets 1987-1992

Executive Overview

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DECEMBER 1987

U.S. INFORMATION SERVICES INDUSTRY-SPECIFIC AND CROSS-INDUSTRY MARKETS, 1987-1992

EXECUTIVE OVERVIEW

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Executive Overview

A

Introduction

1. Overview

This report is produced as part of INPUT's Market Analysis and Planning Service (MAPS) for the information services industry in the U.S.

Information services is composed of the following four modes of service:

- Processing/network services
- Software products
- Professional services
- Turnkey systems

Each of these services is defined in detail in Appendix A.

For each mode, the following will be presented:

- A five-year annual forecast for 1987-1992
- Driving forces
- Implications for vendors

The five-year annual outlook is slightly down from our 1986 forecast (see reconciliation section in Appendix C for more detail); however, the industry as a whole is still very healthy. The primary reason for the lower forecast for 1992 is the use of different inflation assumptions that were considerably lower than those used in 1986. Since forecasts are in current dollars the impact is obvious. See Exhibit I-4 in Section I.

For each of the delivery modes mentioned above, INPUT has written a separate report (bound in hard cover) that is not part of the two-volume three-ring binder set in which this section is placed. These individual reports are very important complementary reading to the market information supplied in the three-ring binders. The reports are entitled:

- *U.S. Processing/Network Services Market, 1987-1992*
- *U.S. Software Products Market, 1987-1992*
- *U.S. Professional Services Markets, 1987-1992*
- *U.S. Turnkey Systems Market, 1987-1992*

B
Information Services Forecasts

1. Overview

In 1987 information services will have been at a $64 billion expenditure level, as shown in Exhibit II-1. This level is due to the continued success of industry participants in developing and implementing new services that are satisfying the needs of users.

The information services industry has grown in the previous five year period (1982-1986) from $22 billion to $55 billion, i.e., more than doubling. INPUT is forecasting a similar event for the period 1987-1992, albeit at a slightly slower growth rate. The previous five-year growth rate was slightly more than 20%, whereas the 1987-1992 rate is close to 17%.

On the balance the overall market is extremely healthy (in spite of the stock market decline) and will continue to outperform other sectors of the U.S. economy.

2. Driving Forces

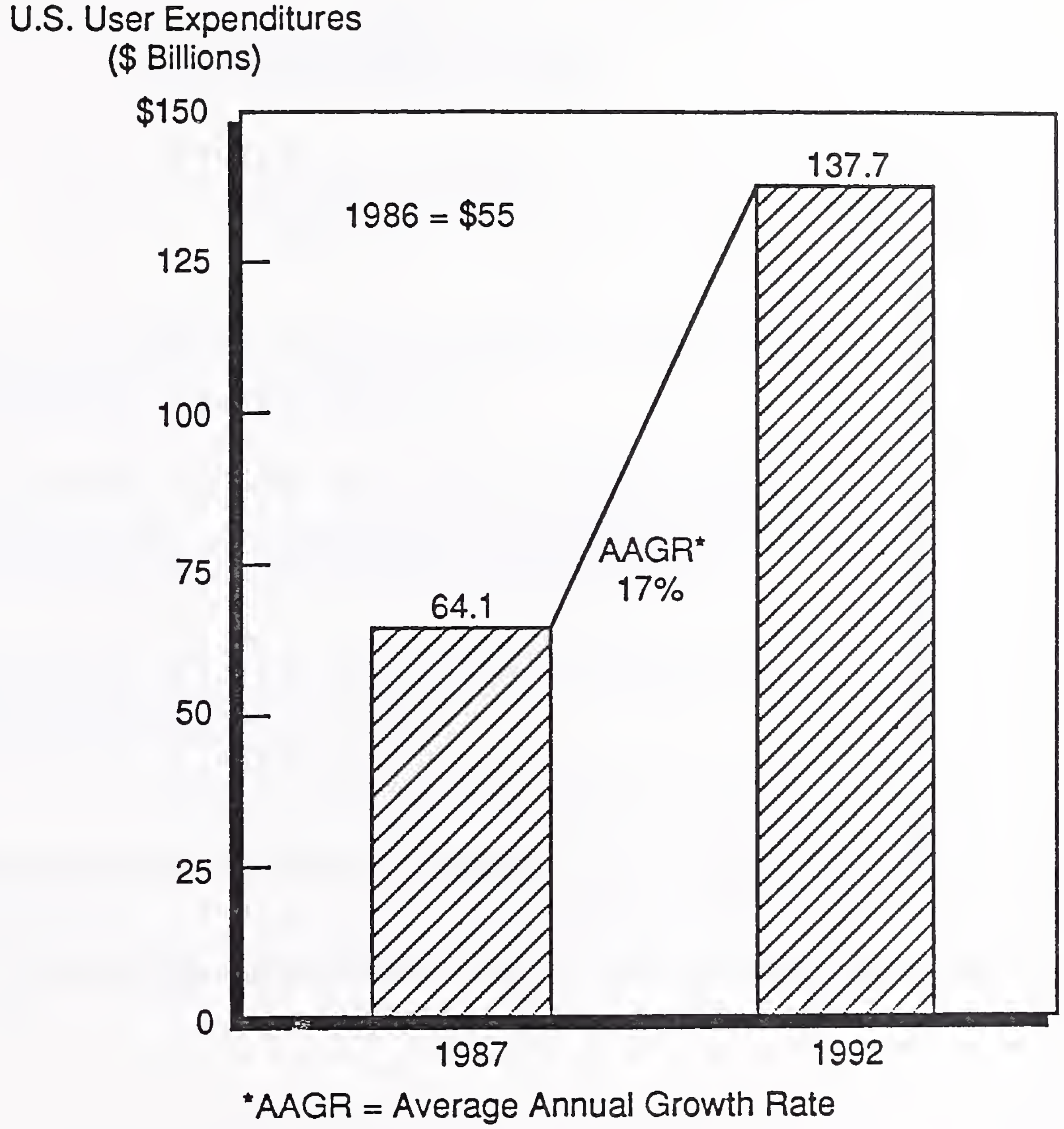
Some of the key factors that are causing the significant growth to continue are shown in Exhibit II-2.

Basically, the information services industry is focusing on specific user needs and on turning industry-specific requirements into automation solutions. This focus is being accomplished using more sophisticated tools that solve the "mission-critical" needs of users.

The information services industry has developed reasonable and acceptable solutions for the first, basic level of applications and is now developing capabilities and solutions for the next tier, i.e., getting closer to the overall needs of the user and the environment. The complexity and

EXHIBIT II-1

INFORMATION SERVICES MARKET



*AAGR = Average Annual Growth Rate

sophistication of these applications means there is an opportunity to further customize and integrate solutions. This opportunity has a domino effect, creating more knowledge and expertise to use the sophisticated tools to solve the more complex requirements. At the same time the existing systems need to be maintained and enhanced, putting a drain on the internal resources to keep the business running. Fortunately, there are professional services firms available to assist in consulting, training, and software development to help enterprises seeking the competitive advantage of implementing these mission-critical systems.

EXHIBIT II-2

MACRO ISSUES
(Information Services)

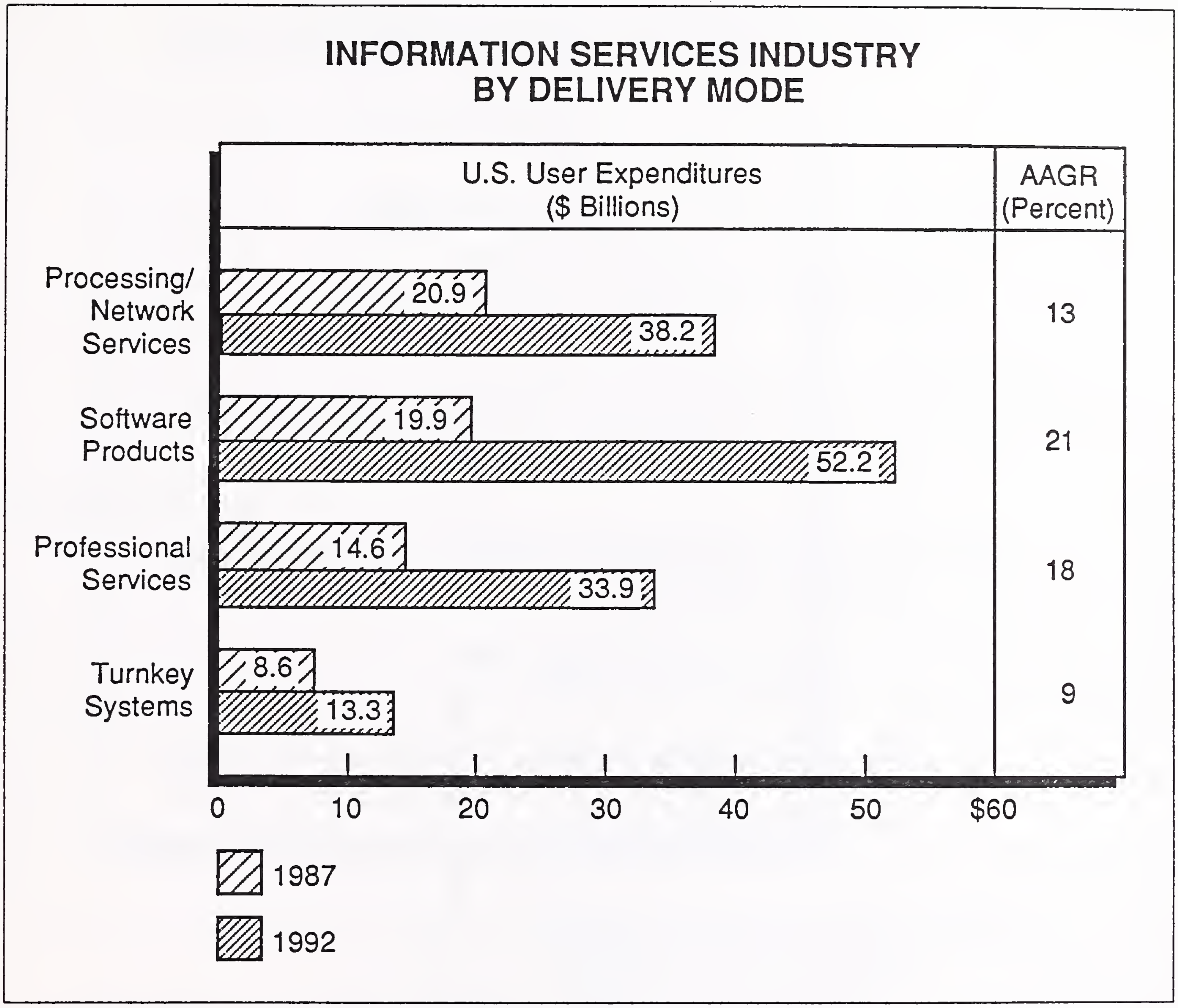
- Focusing on End-User Needs (Vertical)
- Complexity Begets Customization
- Implementation Skill Mix Shortfall Begets Professional Services Boom
- Competitive Advantage Fuels Systems Integration
- Alliance Selection and Formation

Since systems are becoming more complex, functional, and comprehensive, many IS vendors are seeing the merits of forming alliances to provide the total solution. In the past, companies merged, and although mergers are still occurring (at even a faster rate, up until the stock market crash), there are many companies looking at alliances to work together as separate entities. A variety of less-pertinent alliances are being formed; subcontractors, cobidders, and joint ventures are growing in acceptance.

3. Delivery Mode Analysis

The four delivery modes used to segment the information services industry are growing at different rates as shown in Exhibit II-3. (Note: It is recommended that the reader review the separate hardcover reports to better understand the backdrop for this growth.)

EXHIBIT II-3



i. Processing/Network Services

Exhibit II-4 describes the processing/network services driving forces. This delivery mode has been growing at a moderate rate for some time. There are several very large revenue participants who have been in this mode for more than two decades, i.e., ADP, McDonnell Douglas, Boeing, Control Data, GEISCO, etc. There is an extremely high entry cost to join the ranks of these industry veterans.

EXHIBIT II-4

PROCESSING/NETWORK SERVICES: DRIVING FORCES

- Mature Market
  - Few Competitive Changes
  - Cost of Entry High
  - Steady Growth
- On-Line Data Base Segment Growing
  - CD-ROM Impact
- RCS Growing Steadily but Batch Declining
- EDI Evolving Quickly
- Major Impact to On-Line Data Base Services Would Be FCC (Proposed) Access Charge

Those that enter the market are able to leverage VAN services to offer niche-oriented capabilities such as an on-line data base vendor. There seems to be a vendor or two a week entering the OLDB market. This specific submode is being impacted by two events:

- CD-ROM, which can supplant the need for on-line access.
- The proposed FCC access charge for enhanced services, which would increase the connect time charges significantly.

(Note: Readers interested in the OLDB market should review the major INPUT study published in late 1987 entitled *Online Data Base Markets, 1987-1992.*)

Electronic Data Interchange is growing at an 80-90% clip and seems on track to become a large, $ 1-billion-plus submode in processing/network services. (Note: Readers interested in EDI should contact INPUT regarding its separate program monitoring EDI.)

ii. Software Products

The driving forces in software products are shown in Exhibit II-5.

Software products is the fastest-growing delivery mode, growing at slightly more than 21% over the 1987-1992 timeframe.

This delivery mode has a low cost of entry to develop the software, but not necessarily to launch the product and provide continuing sales, marketing, and support. The point is that anyone with a microcomputer can

EXHIBIT II-5

SOFTWARE PRODUCTS MARKET: DRIVING FORCES

- Still in Growth Phase
    - New Markets Emerging
    - Cost of Entry Still Low
- Departmental Systems and Micro Hardware Units Increase
- Micro-Mainframe Linkages
- Increased User Sophistication
- Buying Responsibility Changing

work at home with minimal capital outlay to develop useful software, but gaining market acceptance is a different story.

This growth is occurring because of the large number of midrange computer systems and microcomputer systems that are being purchased and that require software.

End users are becoming more knowledgeable regarding their needs and more aware of the software available to help them develop their own solutions. This increase in knowledge is a significant factor in the growth of the DBMS market. (Note: Readers interested in the DBMS market should refer to an INPUT special report written in mid-1987 entitled Future DBMS Markets, 1987-1992.)

Another factor in continuing growth is the increased number of PC-oriented buyers, making it easier for energetic vendors to break through the IS manager's control. Users are now looking for applications that come closer to meeting the needs of their particular working environment.

iii. Professional Services

The driving forces in the professional services delivery mode are shown in Exhibit II-6.

Professional services is the second-fastest-growing delivery mode in the five-year planning period, growing at more than 18%. INPUT believes this rate is about as fast as this delivery mode can grow due to its high reliance on people (short of dramatically raising prices).

The professional services companies are going through a growth period requiring increased focus and specialization to allow them to differentiate themselves from their competitors.

Commercial systems integration is growing in excess of 37% per year and represents an opportunity for many professional services firms—not only the largest players.

EXHIBIT II-6

PROFESSIONAL SERVICES: DRIVING FORCES

- Differentiation Phase
  - New Markets Emerging
  - Cost of Entry Medium
  - High Growth
  - People Intensive
- Specialization Increasing
- Distribution Potential
- Alliances
- Product Sophistication
- Commercial SI Increasing

iv. Turnkey Systems

The turnkey systems market is going through some difficult times and may have come to a saturation phase by virtue of its industry dynamics. Exhibit II-7 summarizes the driving forces in this delivery mode. The hardware portion of turnkey systems is being challenged in several ways:

- The hardware manufacturers are trying to decrease OEM/VAR discounts and/or increase the turnkey vendors' annual commitment.

- The computer industry seems to be settling in on a few "standard" platforms, suggesting that those turnkey vendors with proprietary hardware may have a difficult time.

- Hardware vendors are cannibalizing the VAR channel by offering their own turnkey systems and by selling the hardware directly to the turnkey vendor "prospect", the end user.

EXHIBIT II-7

TURNKEY SYSTEMS: DRIVING FORCES

- Saturation Phase
  - Tough Market
  - Cost of Customizaton
  - Slow Growth
- Hardware Vendors Providing Solutions
- Customizing Potential
- Hardware Profit Contribution Decreasing
- Hardware Vendors Competing on Hardware Portion

For all these reasons, INPUT is forecasting the growth of turnkey systems vendors to be only 9% over the five-year period.

v. Industry-Specific or Vertical Markets

As part of the MAPS service INPUT provides industry-specific and cross-industry reports, which are found in the rest of the binder(s). Exhibits II-8 and II-9 indicate the "hot" industry sectors by size and AAGR (average annual growth rate).

The larger, more established vertical markets will continue to grow, and remain the largest at the end of the five-year forecast period.

The smaller industry segments are growing at faster rates because vendors in those markets have been slightly behind the power curve in developing applications, and to some extent are playing catch-up.

EXHIBIT II-8

"HOT" VERTICALS BY SIZE: USER EXPENDITURES

MARKET	$ BILLIONS 1986	$ BILLIONS 1987	$ BILLIONS 1992	AAGR (Percent)
Banking/Finance	5.6	6.5	13.1	15
Discrete Manufacturing	3.3	3.8	6.9	13
Medical	2.1	2.5	5.1	15

EXHIBIT II-9

"HOT" VERTICALS BY AAGR USER EXPENDITURES

MARKET	$ BILLIONS 1986	$ BILLIONS 1987	$ BILLIONS 1992	AAGR (Percent)
Telecommunications	0.7	0.9	2.0	19
Transportation	0.5	0.6	1.4	17
State and Local Government	0.6	0.8	1.6	15

C

New Markets and Opportunities

In the four-volume companion reports that analyze delivery modes, prominent new markets and opportunities are identified. The more significant ones are presented in Exhibit II-10. These are areas that vendors should be evaluating for potential entry.

EXHIBIT II-10

NEW MARKETS AND OPPORTUNITIES

- Processing/Network Services
  - Electronic Data Interchange
- Software Products
  - CASE
  - Electronic Publishing
  - Executive Information Systems (EIS)
  - Data Center Management Tools
  - Data Base Management Systems
- Professional Services
  - Commercial Systems Integration
- Turnkey
  - Professional Services Thrust

D

IBM Status

IBM has an impact in the information services business (by default), and it is INPUT's view that IBM will be attempting to increase its impact in the next few years. Exhibit II-11 shows the four delivery modes and one or two key events that indicate IBM's intentions.

EXHIBIT II-11

IBM STATUS IN INFORMATION SERVICES INDUSTRY

- Processing Services
  - Information Network/SIS (EDI)
- Software Products
  - System Application Architecture
  - Applications System Division
- Professional Services
  - Systems Integration
  - Segment Focus
- Turnkey Systems
  - Serious Evaluation!

In processing/network services, IBM is encouraging its vendors to use EDI to communicate with IBM to improve IBM-vendor interaction. Such a policy will generate revenue and also acclimate vendors to the benefits of EDI.

In software products IBM announced the formation of the Applications Systems Division to harness several thousand programmers to develop applications. In 1986, software products provided a disproportionate amount of growth (approximately 60% of the growth of the entire corporation), and this growth was mostly on the systems software side of the business. In addition, the initial promise of Systems Application Architecture (SAA) should encourage additional independent vendors to consider "the IBM way" as their applications will then become independent of the hardware platform and operating system nuances.

In professional services IBM announced a marketing thrust into the commercial sector and is lining up appropriate alliances to faster penetrate this growing market. In addition, IBM is targeting industry focus and developing expertise in several vertical markets to be announced. INPUT believes these areas to be banking and finance, discrete manufacturing, process manufacturing, and medical. It should be noted that IBM is hiring almost at will in the professional services arena while using enhanced retirement programs throughout the rest of the organization, as a means to control its personnel levels.

Although IBM may not be prominent in turnkey systems (perhaps by its definition), it is INPUT's belief that the desktop SolutionPac is a turnkey system. IBM has other SolutionPacs that are the "software" solution, but the desktop one definitely meets INPUT's definition of a turnkey system. Development of new vertical-market applications software will propel IBM toward more aggressive turnkey systems marketing of the new software and IBM hardware.

E

Overall Conclusions

There is no doubt that prospects for the information industry are bullish. INPUT is forecasting overall information services revenues to be $138 billion in 1992.

The ability to attract and train talented people will be key to the success of individual vendors, as complex application and systems require more in-depth skills to bring these new capabilities to the market. Knowledgeable, motivated, and well-trained people are the key to success in the professional services market. Fortunately the educational system in the U.S. is responding (or is it clever marketing on the part of some hardware vendors?) by providing computer training at the elementary-school level. This training ensures a large population of users who will be acclimated to the use of computers (and will probably provide a topic for the 1993-1998 planning period).

The acceptance of computers has occurred, and enterprises are searching for ways to become more productive. This search translates into demand for information services.

EXHIBIT II-12

CONCLUSIONS

- People Critical to Success
- New Application Opportunities
- Information Services Outlook Bullish
- Technology Provides New Opportunities

EO-A

Appendix: INPUT Definitions

A

Appendix: INPUT Definitions

Information Services —Computer-related services involving one or more of the following:

- Processing of computer-based applications using vendor computers (called "processing services").
- Services that assist users in performing functions on their own computers or vendor computer (called "software products" and/or "professional services").
- Services that utilize a combination of hardware and software, integrated into a total system (called "turnkey systems").

A

User Expenditures

All user expenditures reported are "available" (i.e., noncaptive, as defined below).

Noncaptive Information Services User Expenditures—Expenditures paid for information services provided by a vendor that is not part of the same parent corporation as the user.

Captive Information Services User Expenditures—Expenditures received from users who are part of the same parent corporation as the vendor.

B

Delivery Modes

Processing services —This category includes remote computing services, batch services, processing facilities management, on-line data bases, and value-added networks.

- *Remote Computing Services (RCS)* —Provision of data processing to a user by means of terminals at the user's site(s). Terminals are connected by a data communications network to the vendor's central computer. RCS includes four submodes.

- *Interactive* —Characterized by the interaction of the user with the system, primarily for problem-solving timesharing, but also for data entry and transaction processing; the user is on-line to the program/files. Computer response is usually measured in seconds or fractions of a second.

- *Remote Batch* —Where the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is measured in minutes or hours.

- *Proprietary Data Base* —Characterized by the retrieval and processing of information from a vendor-maintained data base. The data base may be owned by the vendor or by a third party.

- *User Site Hardware Services (USHS)* —Those offerings provided by RCS vendors that place programmable hardware at the user's site rather than at the vendor's data center. Some vendors in the federal government market provide this service under the label of distributed data services. USHS offers:

    - Access to a communications network.

    - Access through the network to the RCS vendor's larger computers.

    - Local management and storage of a data base subset that will service local terminal users via the connection of a data base processor to the network.

    - Significant software as part of the service.

- *Batch Services* —These include data processing at vendors' sites for user programs and/or data that are physically transported (as opposed to transported electronically by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing.

- *Processing Facilities Management (PFM)* —Also referred to as "Resource Management," "Systems Management," or "COCO" (contractor-owned, contractor-operated). PFM is the management of all or part of a user's data processing functions under a long-term contract of not less than one year. This would include remote computing and batch services. To qualify as PFM, the contractor must directly plan, control, operate, and own the facility provided to the user–either onsite, through communications lines, or in a mixed mode.

- *Value-Added Networks (VANs)* —VANs typically involve common carrier network transmission facilities that are augmented with computerized switching. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Telenet and TYMNET) employ packet-switching techniques. However, other added data service features such as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing are of equal importance.

Processing services are further differentiated as follows:

- *Cross-industry* services involve the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but that cut across industry lines. Most general-ledger, accounts receivable, payroll, and personnel applications fall into this category. Cross-industry data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry-specific (see below).

- *Industry-specific* services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be either business or scientific in orientation. Industry-specific data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry-specialty applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

- *Utility* services are those for which the vendor provides access to a computer and/or communications network with basic software that enables users to develop and/or process their own systems. These basic tools often include terminal-handling software, sorts, language compilers, data base management systems, information retrieval software, scientific library routines, and other systems software.

Software products —This category includes user purchases of applications and systems software packages for in-house computer systems.

Included are lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement and maintain the package at the user's sites. Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself. There are several subcategories of software products, as indicated below.

- *Applications Products* —Software that performs processing that services user functions directly related to solving a business or organizational need. The products can be:
  - *Cross industry Products* —Used in multiple-industry applications as well as the federal government sector. Examples are payroll, inventory control, and financial planning.
  - *Industry-Specific Products* —Used in a specific industry sector, such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, and material resource planning.
- *Systems Software Products* —Software that enables the computer/ communications system to perform basic functions. These products include:
  - *System Control Products* —Function during applications program execution to manage the computer system resources. Examples include operating systems, communication monitors, emulators, and spoolers.
  - *Data Center Management Products* —Used by operations personnel to manage the computer systems resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, and utilities.
  - *Applications Development Products* —Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include languages, sorts, productivity aids, compilers, data dictionaries, data base management systems, report writers, project control systems, and retrieval systems.

Professional Services—This category includes consulting, education and training, programming and analysis, and some facilities management as defined below.

- *Software development* —This service develops a software system on a custom basis. It includes one or more of the following: user requirements, system design, contract, and programming.

- *Education and Training* —Products and/or services related to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming, and maintenance.

- *Consulting Services* —Information systems and/or services management consulting, program assistance (technical and/or management), feasibility analyses, and cost-effectiveness trade-off studies.

- *Professional Services Facilities Management (PSFM)* —This is a counterpart to processing facilities management, except the computing equipment is owned or leased by the client, not by the vendor. The vendor provides the staff to operate, maintain, and manage the client's facility.

Turnkey Systems (also known as integrated systems)—A turnkey system is an integration of systems and applications software with CPU hardware and peripherals, packaged as a single applications solution. The value added by the vendor is primarily in the software and support. Most CAD/CAM systems and many small-business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems, nor does it include Embedded Computer Resources for military applications. Turnkey systems are available either as custom or packaged systems.

- Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors.

- Turnkey systems revenue is divided into two categories.

  - *Industry-specific systems* —that is, systems that serve a specific function for a given industry sector such as automobile dealer parts inventory, CAD/CAM systems, or discrete manufacturing control systems.

  - *Cross-industry systems* —that is, systems that provide a specific function that is applicable to a wide range of industry sectors such as financial planning systems, payroll systems, or personnel management systems.

- Revenue includes hardware, software, and support functions.

Systems Integration —Services associated with systems design, integration of computing components, installation, and acceptance of computer/communication systems. Systems integration can include one or more of the major information services delivery modes—professional services, turnkey systems, and software products. System components may be furnished by separate vendors (not as an integrated system by one vendor, called the prime contractor); services may be furnished by a vendor or by a not-for-profit organization. Integration services also may be provided with related engineering activities, such as SE&I (Systems Engineering and Integration) or SETA (Systems Engineering and Technical Assistance).

C

Hardware/Hardware Systems

Hardware —Includes all computer and telecommunications equipment that can be separately acquired with or without installation by the vendor and not acquired as part of an integrated system.

- *Peripherals* —Includes all input, output, communications, and storage devices other than main memory that can be connected locally to the main processor and generally cannot be included in other categories such as terminals.
- *Input Devices* —Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors, and analog-to-digital converters.
- *Output Devices* —Includes printers, CRTs, projection television screens, micrographics processors, digital graphics, and plotters.
- *Communication Devices* —Includes modems, encryption equipment, special interfaces, and error control.
- *Storage Devices* —Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories.

Terminals—There are three types of terminals as described below:

- *User-Programmable* —Also called intelligent terminals, including:
  - Single-station or standalone.
  - Multistation shared processor.
  - Teleprinter.
  - Remote batch.

- *User Nonprogrammable*
  - Single-station.
  - Multistation shared processor.
  - Teleprinter.

- *Limited Function* —Originally developed for specific needs, such as point-of-sale (POS), inventory data collection, controlled access, and other applications.

Hardware Systems —Includes all processors from microcomputers to supercomputers. Hardware systems may require type- or model-unique operating software to be functional, but this category excludes applications software and peripheral devices, other than main memory and processors or CPUs not provided as part of an integrated (turnkey) system.

- *Microcomputer* —Combines all of the CPU, memory, and peripheral functions of an 8- or 16-bit computer on a chip in the form of:
  - Integrated circuit package.
  - Plug-in board with more memory and peripheral circuits.
  - Console including keyboard and interfacing connectors.
  - Personal computer with at least one external storage device directly addressable by the CPU.

- *Minicomputer* —Usually a 12-, 16- or 32-bit computer that may be provided with limited applications software and support and may represent a portion of a complete large system.
  - Personal business computer.
  - Small laboratory computer.
  - Nodal computer in a distributed data network, remote data collection network, or connected network, or connected to remote microcomputers.

- *Mainframe*—Typically a 32- or 64-bit computer with extensive applications software and a number of peripherals in standalone or multiple-CPU configurations for business (administrative, personnel, and logistics) applications; also called a general-purpose computer.
  - *Large Computer* —Presently centered around storage controllers but likely to become bus-oriented and to consist of multiple processors or parallel processors. Intended for structured mathematical and signal processing and typically used with general-purpose, von-Neumann-type processors for system control.

- *Supercomputer* —High-powered processors with numerical processing throughout that is significantly greater than the fastest general-purpose computers, with capacities in the vicinity of 10-50 million floating point operations per second (MFLOPS). Supercomputers fit in one of two categories:

- *Real Time* —Generally used for signal processing in military applications.

- *Non-Real Time* —For scientific use in one of three configurations:

  - Parallel processors.
  - Pipeline processor.
  - Vector processor.

- *Newer Supercomputers* —with burst modes approaching 300 MFLOPS, main storage size up to 10 million words, and on-line storage in the one- to three-gigabyte class are also becoming more common.

- *Embedded Computer* —Dedicated computer system designed and implemented as an integral part of a weapon, weapon system, or platform; critical to a military or intelligence mission such as command and control, cryptological activities, or intelligence activities. Characterized by military specifications (MIL SPEC) appearance and operation, limited but reprogrammable applications software, and permanent or semipermanent interfaces. May vary in capacity from microcomputers to parallel processor computer systems.

D

Telecommunications

Networks —Electronic interconnection between sites or locations that may incorporate links between central computer sites and remote locations and switching and/or regional data processing nodes. Network services typically are provided on a leased basis by a vendor to move data, voice, video, or textual information between locations. Networks can be categorized in several different ways.

- *Common Carrier Network* —A public access network, such as provided by AT&T, consisting of conventional voice-grade circuits and regular switching facilities accessed through dial-up calling with leased or user-owned modems for transfer rates between 150 and 1200 baud.

- *Value-Added Network (VAN)* —(See listing under Section B, Delivery Modes.)

- *Local Area Network (LAN)* —Limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. Uses one of two signaling methods.

- *Baseband* —Signaling using digital waveforms on a single frequency band, usually at voice frequencies and bandwidth, and limited to a single sender at any given moment. When used for local-area networks, typically implemented with TDM to permit multiple access.
- *Broadband* —Transmission facilities that use frequencies greater than normal voice-grade, supported in local-area networks with RF modems and AC signaling. Also known as wideband. Employs multiplexing techniques that increase carrier frequency between terminals to provide:
    - Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing).
    - Multiple (time-sequenced) channels via TDM (Time Division Multiplexing).
    - High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media).

Transmission Facilities— Includes wire, carrier, coaxial cable, microwave, optical fiber, satellites, cellular radio, and marine cable operating in one of two modes depending on the vendor and the distribution of the network.

- *Mode* —may be either:
    - *Analog* —Transmission or signal with continuous-waveform representation, typified by AT&T's predominantly voice-grade DDD network and most telephone operating company distribution systems.
    - *Digital* —Transmission or signal using discontinuous, discrete quantities to represent data, which may be voice, data, record, video, or text, in binary form.
- *Media*—May be any of the following:
    - *Wire* —Varies from earlier single-line teletype networks, to two-wire standard telephone (twisted pair), to four-wire full- duplex balanced lines.
    - *Carrier* —A wave, pulse train, or other signal suitable for modulation by an information-bearing signal to be transmitted over a communications system, used in multiplexing applications to increase network capacity.

- *Coaxial Cable* —A cable used in HF (high-frequency) and VHF (very high frequency), single-frequency, or carrier-based systems; requires frequent reamplification (repeaters) to carry the signal any distance.

- *Microwave* —UHF (ultra-high-frequency) multichannel, point-to-point, repeated radio transmission, also capable of wide frequency channels.

- *Optical Fiber* —Local signal distribution systems employed in limited areas, using light-transmitting glass fibers and TDM for multichannel applications.

- *Communications Satellites*—Synchronous earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities for up- and down-link operation.

- *Cellular Radio* —Network of fixed, low-powered two-way radios that are linked by a computer system to track mobile phone/data set units. Each radio serves a small area called a cell. The computer switches service connections to the mobile unit from cell to cell.

E

Other Considerations

When questions arise about the proper place to count certain user expenditures, INPUT addresses them from the user viewpoint. Expenditures are then categorized according to what users perceive they are buying.

The standard industrial classification (SIC) codes are used to define the economic activity contained in generic sectors such as process manufacturing, insurance, or transportation.

The specific industries (and their SIC codes) included under these generic industry sectors are detailed in the exhibit.

EXHIBIT A-1

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Discrete Manufacturing	23	Apparel
	25	Furniture
	27	Printing
	31	Leather
	34	Metal
	35	Machinery
	36	Electronics
	37	Transportation
	38	Scientific and Control Instruments
	39	Miscellaneous
Process Manufacturing	10	Metal Mining
	11	Anthracite Mining
	12	Coal Mining
	13	Oil and Gas Extraction
	14	Mining/Quarrying of Non-Metallic Minerals, except Fuels
	20	Food Products
	21	Tobacco
	22	Textile Products
	24	Lumber and Wood Products
	26	Paper Products
	28	Chemicals
	29	Petroleum
	30	Rubber and Plastics
	32	Stone, Glass, Clay
	33	Primary Metals
Transportation	40	Railroads
	41	Local Transit
	42	Motor Freight
	43	U.S. Postal Service
	44	Water Transportation
	45	Air
	46	Pipelines
	47	Transportation Services

EXHIBIT A-1a

INDUSTRY SECTOR DEFINITIONS
(Cont.)

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Utilities	49	Electric, Gas, and Sanitary
Telecommunications	48	Communications
Wholesale Distribution	50	Durable Goods
	51	Nondurable Goods
Retail Distribution	52	Building Materials, Hardware
	53	General Merchandise
	54	Food
	55	Automotive and Gas Stations
	56	Apparel
	57	Furniture
	58	Eating and Drinking
	59	Miscellaneous Retail
Banking and Finance	60	Banks
	61	Credit Agencies
	62	Security and Commodity Brokers
	67	Holding and Investment Offices
Insurance	63	Insurance (Life, Health, Etc.)
	64	Insurance Agents
Medical	80	Health Services
Education	82	Educational Services

EXHIBIT A-1b

INDUSTRY SECTOR DEFINITIONS (Cont.)

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Services	72	Personal Services
	73	Business Services (Excluding Information Services Companies Themselves)
	89	Miscellaneous Services
	66	Combinations of Real Estate, Insurance, Loans, Law Offices
	81	Legal Services
	76	Miscellaneous Repair
Federal Government	N/A	As Appropriate
State and Local Government	N/A	As Appropriate
Other Industries	01-09	Agriculture, Forestry, and Fishing
	15-17	Construction
	70	Hotels, Rooming Houses, Camps, and Other Lodging Places
	75	Automotive Repair, Services, and Garages
	78	Motion Pictures
	79	Amusement and Recreation Services, Except Motion Pictures
	83	Social Services
	84	Museums, Art Galleries, Botanical and Zoological Gardens
	86	Membership Organizations

EO-B

Appendix: Market Forecast Data Base

EXHIBIT B-1

TOTAL INFORMATION SERVICES MARKET FORECAST BY DELIIVERY MODE, 1987 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMPUTING/BATCH SVCS									
INDUSTRY-SPECIFIC	8999	16%	10410	11945	13704	15646	17816	20116	14%
CROSS-INDUSTRY	3921	11%	4355	4852	5370	6026	6732	7496	11%
UTILITY PROCESSING	2221	9%	2410	2620	2787	2964	3153	3324	7%
SUBTOTAL	15141	13%	17175	19417	21861	24636	27701	30936	12%
FACILITIES MANAGEMENT									
INDUSTRY-SPECIFIC	2547	13%	2876	3248	3640	4089	4583	5108	12%
CROSS-INDUSTRY	62	0%	62	64	64	65	66	68	2%
UTILITY PROCESSING	181	15%	208	236	263	300	343	389	13%
SUBTOTAL	2790	13%	3146	3548	3967	4454	4992	5565	12%
TOTAL PROCESSING/NETWORKK SVCS									
INDUSTRY-SPECIFIC	11546	15%	13286	15193	17344	19735	22399	25224	14%
CROSS-INDUSTRY	3983	11%	4417	4916	5434	6091	6798	7564	11%
UTILITY PROCESSING	2402	9%	2618	2856	3050	3264	3496	3713	7%
VANS	409	32%	539	705	907	1132	1414	1742	26%
TOTAL	18340	14%	20860	23670	26735	30222	34107	38243	13%
SOFTWARE PRODUCTS									
APPLICATION SOFTWARE									
MAINFRAME/MINICOMPUTER									
INDUSTRY-SPECIFIC	3546	21%	4273	5079	5967	6942	7990	9105	16%
CROSS-INDUSTRY	2517	16%	2926	3405	3906	4391	4888	5392	13%
SUBTOTAL	6063	21%	7199	8484	9873	11333	12878	14497	20%
MICROCOMPUTER									
INDUSTRY-SPECIFIC	778	40%	1091	1467	1889	2354	2869	3470	26%
CROSS-INDUSTRY	1720	19%	2054	2441	2868	3438	4039	4614	18%
SUBTOTAL	2498	30%	3145	3908	4757	5792	6908	8084	25%
TOTAL APPLICATION SOFTWARE	8561	21%	10344	12392	14630	17125	19786	22581	17%
SYSTEMS SOFTWARE									
MAINFRAME/MINICOMPUTER	6648	23%	8179	10135	12555	15573	19363	24127	24%
MICROCOMPUTER	977	42%	1384	1900	2546	3340	4309	5511	32%
TOTAL SYSTEMS SOFTWARE	7625	25%	9563	12035	15101	18913	23672	29638	25%
TOTAL SOFTWARE	16186	23%	19907	24427	29731	36038	43458	52219	21%
PROFESSIONAL SERVICES									
SOFTWARE DEVELOPMENT	6441	17%	7555	8584	9732	11102	12694	14471	14%
CONSULTING	2017	22%	2460	2913	3527	4268	5225	6360	21%
EDUCATION	1313	22%	1606	1910	2304	2785	3384	4180	21%
SYSTEMS INTEGRATION	1613	24%	2002	2568	3315	4294	5590	7292	30%
FACILITIES MANAGEMENT	908	9%	987	1084	1186	1292	1412	1570	10%
TOTAL PROFESSIONAL SERVICES	12292	19%	14610	17059	20064	23741	28305	33873	18%
TURNKEY SYSTEMS									
INDUSTRY-SPECIFIC	5323	13%	5994	6697	7433	8214	9052	9902	11%
CROSS-INDUSTRY	2476	7%	2644	2788	2965	3133	3269	3423	5%
TOTAL TURNKEY SYSTEMS	7799	11%	8638	9485	10398	11347	12321	13325	9%
GRAND TOTAL	54617	17%	64015	74641	86928	101348	118191	137660	17%

EXHIBIT B-2

TOTAL INFORMATION SERVICES USER EXPENDITURE FORECAST BY MARKET SEGMENT, 1986 - 1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
INDUSTRY-SPECIFIC									
DISCRETE MANUFACTURING	3300	16%	3827	4399	4986	5607	6265	6935	13%
PROCESS MANUFACTURING	1277	13%	1446	1632	1838	2062	2301	2553	12%
TRANSPORTATION	547	17%	640	752	883	1031	1201	1391	17%
UTILITIES	297	15%	341	394	456	524	601	693	15%
TELECOMMUNICATIONS	711	22%	866	1044	1250	1486	1752	2040	19%
DISTRIBUTION	1881	18%	2218	2588	2997	3456	3957	4503	15%
BANKING AND FINANCE	5588	16%	6504	7536	8716	10037	11556	13149	15%
INSURANCE	1275	16%	1478	1706	1951	2214	2500	2824	14%
MEDICAL	2129	18%	2516	2944	3415	3922	4457	5051	15%
EDUCATION	317	14%	361	404	448	494	543	590	10%
SERVICES	1501	15%	1731	1981	2260	2562	2878	3200	13%
FEDERAL GOVERNMENT	952	10%	1048	1121	1213	1324	1444	1559	8%
STATE AND LOCAL GOVERNMENT	638	18%	755	883	1023	1179	1355	1550	15%
OTHER INDUSTRY-SPECIFIC	780	17%	913	1052	1197	1347	1500	1663	13%
SUB-TOTAL	21193	16%	24644	28436	32633	37245	42310	47701	14%
CROSS-INDUSTRY									
PLANNING AND ANALYSIS	1939	11%	2150	2388	2621	2932	3193	3418	10%
ACCOUNTING	2546	9%	2772	3014	3286	3526	3738	3915	7%
HUMAN RESOURCES	1671	15%	1924	2202	2452	2680	2915	3132	10%
ENGINEERING/SCIENTIFIC	797	14%	911	1040	1198	1366	1557	1761	14%
EDUCATION/TRAINING	308	15%	354	398	446	499	553	607	11%
ON-LINE DATA BASES	833	25%	1045	1283	1545	1964	2377	2892	23%
OTHER CROSS-INDUSTRY	2602	11%	2885	3225	3625	4086	4661	5268	13%
SUB-TOTAL	10696	13%	12041	13550	15173	17053	18994	20993	12%
OTHER									
PROFESSIONAL SERVICES	12292	19%	14610	17059	20064	23741	28305	33873	18%
UTILITY PROCESSING	2402	9%	2618	2856	3050	3264	3496	3713	7%
SYSTEMS SOFTWARE	7625	25%	9563	12035	15101	18913	23672	29638	25%
VANS	409	32%	539	705	907	1132	1414	1742	26%
GRAND TOTAL	54617	17%	64015	74641	86928	101348	118191	137660	17%

EXHIBIT B-3

TOTAL PROCESSING/NETWORK SERVICES USER EXPENDITURE FORECAST BY MARKET SEGMENT, 1986 - 1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
INDUSTRY-SPECIFIC									
DISCRETE MANUFACTURING	683	15%	785	895	1010	1132	1259	1386	12%
PROCESS MANUFACTURING	805	15%	927	1061	1210	1374	1547	1728	13%
TRANSPORTATION	239	10%	264	298	341	394	461	536	15%
UTILITIES	140	10%	154	171	190	209	230	255	11%
TELECOMMUNICATIONS	420	21%	510	611	726	857	1002	1147	18%
DISTRIBUTION	949	16%	1102	1265	1443	1646	1863	2109	14%
BANKING AND FINANCE	3790	16%	4387	5066	5850	6735	7780	8865	15%
INSURANCE	705	12%	792	887	989	1098	1219	1346	11%
MEDICAL	1102	17%	1289	1503	1738	1999	2281	2616	15%
EDUCATION	134	11%	149	163	179	197	215	234	9%
SERVICES	991	15%	1136	1295	1475	1667	1866	2061	13%
FEDERAL GOVERNMENT	536	7%	573	588	620	659	702	745	5%
STATE AND LOCAL GOVERNMENT	481	19%	570	665	768	882	1008	1146	15%
OTHER INDUSTRY-SPECIFIC	571	13%	648	725	805	886	966	1050	10%
SUB-TOTAL	11546	15%	13286	15193	17344	19735	22399	25224	14%
CROSS-INDUSTRY									
PLANNING AND ANALYSIS	235	0%	235	239	235	234	232	229	-1%
ACCOUNTING	988	4%	1024	1048	1086	1105	1132	1142	2%
HUMAN RESOURCES	932	14%	1061	1221	1386	1552	1746	1934	13%
ENGINEERING/SCIENTIFIC	247	6%	263	281	297	309	327	339	5%
EDUCATION/TRAINING	84	11%	93	104	113	119	127	132	7%
ON-LINE DATA BASES	833	25%	1045	1283	1545	1964	2377	2892	23%
OTHER CROSS-INDUSTRY	664	5%	696	740	772	808	857	896	5%
SUB-TOTAL	3983	11%	4417	4916	5434	6091	6798	7564	11%
OTHER									
UTILITY PROCESSING	2402	9%	2618	2856	3050	3264	3496	3713	7%
VALUE ADDED NETWORKS	409	32%	539	705	907	1132	1414	1742	26%
GRAND TOTAL	18340	14%	20860	23670	26735	30222	34107	38243	13%

EXHIBIT B-4

REMOTE COMPUTING/BATCH SERVICES USER EXPENDITURE FORECAST BY MARKET SECTOR, 1986 - 1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
INDUSTRY-SPECIFIC									
DISCRETE MANUFACTURING	631	15%	726	828	935	1047	1163	1279	12%
PROCESS MANUFACTURING	761	16%	880	1012	1159	1321	1493	1673	14%
TRANSPORTATION	212	11%	236	269	312	365	431	506	16%
UTILITIES	119	10%	131	145	161	177	194	214	10%
TELECOMMUNICATIONS	400	22%	487	584	695	821	960	1098	18%
DISTRIBUTION	897	16%	1045	1201	1370	1562	1765	1994	14%
BANKING AND FINANCE	2800	16%	3256	3777	4381	5060	5870	6714	16%
INSURANCE	344	15%	395	450	509	570	638	707	12%
MEDICAL	719	18%	847	999	1169	1356	1560	1805	16%
EDUCATION	114	12%	128	142	158	175	193	212	11%
SERVICES	984	15%	1128	1286	1466	1657	1856	2050	13%
FEDERAL GOVERNMENT	323	8%	350	341	357	373	391	408	3%
STATE AND LOCAL GOVERNMENT	134	22%	164	198	240	291	352	424	21%
OTHER INDUSTRY-SPECIFIC	561	14%	637	713	792	871	950	1032	10%
SUB-TOTAL	8999	16%	10410	11945	13704	15646	17816	20116	14%
CROSS-INDUSTRY SECTORS									
PLANNING AND ANALYSIS	235	0%	235	239	235	234	232	229	-1%
ACCOUNTING	988	4%	1024	1048	1086	1105	1132	1142	2%
HUMAN RESOURCES	932	14%	1061	1221	1386	1552	1746	1934	13%
ENGINEERING/SCIENTIFIC	247	6%	263	281	297	309	327	339	5%
EDUCATION/TRAINING	84	11%	93	104	113	119	127	132	7%
ON-LINE DATA BASES	833	25%	1045	1283	1545	1964	2377	2892	23%
OTHER CROSS-INDUSTRY	602	5%	634	676	708	743	791	828	5%
SUB-TOTAL	3921	11%	4355	4852	5370	6026	6732	7496	11%
OTHER SECTORS									
UTILITY PROCESSING	2221	9%	2410	2620	2787	2964	3153	3324	7%
VALUE ADDED NETWORKS	409	32%	539	705	907	1132	1414	1742	26%
GRAND TOTAL	15550	14%	17714	20122	22768	25768	29115	32678	13%

EXHIBIT B-5

PROCESSING FACILITIES MANAGEMENT SERVICES USER EXPENDITURE FORECAST
BY MARKET SEGMENT, 1986 - 1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
INDUSTRY-SPECIFIC									
DISCRETE MANUFACTURING	52	13%	59	67	75	85	96	107	13%
PROCESS MANUFACTURING	44	7%	47	49	51	53	54	55	3%
TRANSPORTATION	27	4%	28	29	29	29	30	30	1%
UTILITIES	21	10%	23	26	29	32	36	41	12%
TELECOMMUNICATIONS	20	15%	23	27	31	36	42	49	16%
DISTRIBUTION	52	10%	57	64	73	84	98	115	15%
BANKING AND FINANCE	990	14%	1131	1289	1469	1675	1910	2151	14%
INSURANCE	361	10%	397	437	480	528	581	639	10%
MEDICAL	383	15%	442	504	569	643	721	811	13%
EDUCATION	20	5%	21	21	21	22	22	22	1%
SERVICES	7	8%	8	9	9	10	10	11	8%
FEDERAL GOVERNMENT	213	5%	223	247	263	286	311	337	9%
STATE AND LOCAL GOVERNMENT	347	17%	406	467	528	591	656	722	12%
OTHER INDUSTRY-SPECIFIC	10	10%	11	12	13	15	16	18	10%
SUB-TOTAL	2547	13%	2876	3248	3640	4089	4583	5108	12%
CROSS-INDUSTRY TOTAL	62	0%	62	64	64	65	66	68	2%
UTILITY PROCESSING SECTOR	181	15%	208	236	263	300	343	389	13%
GRAND TOTAL	2790	13%	3146	3548	3967	4454	4992	5565	12%

EXHIBIT B-6

ON-LINE DATA BASE SERVICES USER EXPENDITURE FORECAST FORECAST BY MARKET SEGMENT, 1986 - 1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
INDUSTRY-SPECIFIC									
DISCRETE MANUFACTURING	149	19%	178	209	257	291	348	416	19%
PROCESS MANUFACTURING	200	16%	231	278	305	364	385	408	12%
TRANSPORTATION	67	10%	74	85	99	114	133	155	16%
UTILITIES	28	14%	32	33	38	43	46	50	9%
TELECOMMUNICATIONS	75	27%	95	121	138	175	215	265	23%
DISTRIBUTION	235	26%	296	363	444	538	634	747	20%
BANKING AND FINANCE	876	15%	1010	1217	1381	1647	1869	2124	16%
INSURANCE	92	12%	103	114	132	151	165	182	12%
MEDICAL	149	27%	189	213	267	309	386	483	21%
EDUCATION	56	11%	62	69	75	84	94	107	12%
SERVICES	299	13%	337	390	434	488	571	670	15%
FEDERAL GOVERNMENT	16	25%	20	25	30	36	45	60	25%
STATE AND LOCAL GOVERNMENT	14	36%	19	23	27	31	36	41	17%
OTHER INDUSTRY-SPECIFIC	65	25%	81	100	122	148	157	167	16%
SUB-TOTAL	2321	17%	2727	3240	3749	4419	5084	5875	17%
CROSS-INDUSTRY									
SECURITIES	183	30%	237	300	377	509	615	747	26%
CREDIT	274	18%	322	362	407	467	523	585	13%
TEXT/BIBLIOGRAPHY	92	20%	110	133	159	191	231	278	20%
NEWS	180	35%	243	312	380	525	688	906	30%
ECONOMIC/OTHER	104	28%	133	176	222	272	320	376	23%
SUB-TOTAL	833	25%	1045	1283	1545	1964	2377	2892	23%
GRAND TOTAL	3154	20%	3772	4523	5294	6383	7461	8767	18%

EXHIBIT B-7

TOTAL SOFTWARE PRODUCTS USER EXPENDITURE FORECAST
BY MARKET SEGMENT. 1986 - 1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
APPLICATIONS SOFTWARE									
INDUSTRY-SPECIFIC									
DISCRETE MANUFACTURING	955	24%	1181	1438	1704	1976	2257	2552	17%
PROCESS MANUFACTURING	138	10%	152	167	183	198	216	234	9%
TRANSPORTAION	174	30%	226	286	354	426	504	591	21%
UTILITIES	130	20%	156	188	226	269	320	381	20%
TELECOMMUNICATIONS	73	47%	107	150	201	261	330	414	31%
DISTRIBUTION	409	26%	515	638	780	945	1132	1335	21%
BANKING AND FINANCE	1130	22%	1376	1647	1952	2288	2650	3035	17%
INSURANCE	391	23%	482	586	699	821	954	1118	18%
MEDICAL	467	27%	594	734	890	1057	1232	1416	19%
EDUCATION	87	21%	105	124	145	167	190	213	15%
SERVICES	144	26%	181	226	280	344	417	502	23%
FEDERAL GOVERNMENT	74	18%	87	103	120	153	187	224	21%
STATE AND LOCAL GOVERNME	55	24%	68	83	100	119	142	168	20%
OTHER INDUSTRY-SPECIFIC	97	38%	134	176	222	272	328	392	24%
SUB-TOTAL	4324	24%	5364	6546	7856	9296	10859	12575	19%
CROSS-INDUSTRY									
PLANNING AND ANALYSIS	1438	13%	1631	1850	2065	2356	2608	2819	12%
ACCOUNTING	1164	15%	1334	1533	1741	1936	2111	2259	11%
HUMAN RESOURCES	522	20%	628	730	799	848	878	898	7%
ENGINEERING/SCIENTIFIC	228	29%	294	379	483	606	751	914	25%
EDUCATION/TRAINING	87	29%	112	137	165	203	243	286	21%
OTHER CROSS-INDUSTRY	798	23%	981	1217	1521	1880	2336	2830	24%
SUB-TOTAL	4237	18%	4980	5846	6774	7829	8927	10006	15%
TOTAL APPLICATIONS SOFTWARE	8561	21%	10344	12392	14630	17125	19786	22581	17%
SYSTEMS SOFTWARE									
APPLICATION DEVELOPMENT	2930	17%	3439	4100	4956	6060	7490	9341	22%
SYSTEMS CONTROL	3058	29%	3934	5092	6570	8505	10988	14212	29%
DATA CENTER MANAGEMENT	1637	34%	2190	2843	3575	4348	5194	6085	23%
TOTAL SYSTEMS SOFTWARE	7625	25%	9563	12035	15101	18913	23672	29638	25%
GRAND TOTAL	16186	23%	19907	24427	29731	36038	43458	52219	21%

EXHIBIT B-8

MINI/MAINFRAME TOTAL SOFTWARE USER EXPENDITURE FORECAST
BY MARKET SEGMENT, 1986 - 1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
APPLICATIONS SOFTWARE									
INDUSTRY-SPECIFIC									
DISCRETE MANUFACTURING	857	18%	1011	1183	1372	1578	1799	2033	15%
PROCESS MANUFACTURING	106	11%	118	130	142	153	166	178	9%
TRANSPORTATION	140	24%	173	213	260	314	374	442	21%
UTILITIES	88	17%	103	121	142	164	190	219	16%
TELECOMMUNICATIONS	61	48%	90	125	165	208	252	297	27%
DISTRIBUTION	294	20%	353	416	483	555	633	710	15%
BANKING AND FINANCE	999	19%	1189	1391	1614	1856	2116	2392	15%
INSURANCE	282	19%	335	395	458	527	601	687	15%
MEDICAL	389	25%	486	593	712	840	974	1112	18%
EDUCATION	30	17%	35	40	46	52	59	66	14%
SERVICES	112	25%	140	174	214	261	313	372	22%
FEDERAL GOVERNMENT	59	19%	70	83	98	124	152	183	21%
STATE AND LOCAL GOVERNME	41	22%	50	60	71	84	99	115	18%
OTHER INDUSTRY-SPECIFIC	88	36%	120	155	190	226	262	299	20%
SUB-TOTAL	3546	21%	4273	5079	5967	6942	7990	9105	16%
CROSS-INDUSTRY									
PLANNING AND ANALYSIS	663	11%	735	838	944	1050	1164	1273	12%
ACCOUNTING	883	13%	995	1121	1248	1360	1470	1567	10%
HUMAN RESOURCES	485	20%	582	673	732	764	778	783	6%
ENGINEERING/SCIENTIFIC	186	28%	239	306	388	480	589	713	24%
EDUCATION/TRAINING	37	30%	48	58	71	84	95	109	18%
OTHER CROSS-INDUSTRY	263	24%	327	409	523	653	792	947	24%
SUB-TOTAL	2517	16%	2926	3405	3906	4391	4888	5392	13%
TOTAL APPLICATIONS SOFTWARE	6063	19%	7199	8484	9873	11333	12878	14497	15%
SYSTEMS SOFTWARE									
APPLICATION DEV TOOLS	2391	11%	2661	3034	3549	4259	5239	6561	20%
SYSTEMS CONTROL	2643	28%	3372	4333	5546	7127	9141	11746	28%
DATA CENTER MANAGEMENT	1614	33%	2146	2768	3460	4187	4983	5820	22%
TOTAL SYSTEMS SOFTWARE	6648	23%	8179	10135	12555	15573	19363	24127	24%
GRAND TOTAL	12711	21%	15378	18619	22428	26906	32241	38624	20%

EXHIBIT B-9

MICROCOMPUTER TOTAL SOFTWARE FORECAST
BY MARKET SEGMENT, 1986 - 1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
APPLICATIONS SOFTWARE									
INDUSTRY-SPECIFIC									
DISCRETE MANUFACTURING	98	73%	170	255	332	398	458	519	25%
PROCESS MANUFACTURING	32	6%	34	37	41	45	50	56	10%
TRANSPORTATION	34	56%	53	73	94	112	130	149	23%
UTITLITIES	42	26%	53	67	84	105	130	162	25%
TELECOMMUNICATIONS	12	42%	17	25	36	53	78	117	47%
DISTRIBUTION	115	41%	162	222	297	390	499	625	31%
BANKING AND FINANCE	131	43%	187	256	338	432	534	643	28%
INSURANCE	109	35%	147	191	241	294	353	431	24%
MEDICAL	78	38%	108	141	178	217	258	304	23%
EDUCATION	57	23%	70	84	99	115	131	147	16%
SERVICES	32	28%	41	52	66	83	104	130	26%
FEDERAL GOVERNMENT	15	13%	17	20	22	29	35	41	19%
STATE AND LOCAL GOVERNME	14	29%	18	23	29	35	43	53	24%
OTHER INDUSTRY-SPECIFIC	9	56%	14	21	32	46	66	93	46%
SUB-TOTAL	778	40%	1091	1467	1889	2354	2869	3470	26%
CROSS-INDUSTRY									
PLANNING AND ANALYSIS	775	16%	896	1012	1121	1306	1444	1546	12%
ACCOUNTING	281	21%	339	412	493	576	641	692	15%
HUMAN RESOURCES	37	24%	46	57	67	84	100	115	20%
ENGINEERING/SCIENTIFIC	42	31%	55	73	95	126	162	201	30%
EDUCATION/TRAINING	50	28%	64	79	94	119	148	177	23%
OTHER CROSS-INDUSTRY	535	22%	654	808	998	1227	1544	1883	24%
SUB-TOTAL	1720	19%	2054	2441	2868	3438	4039	4614	18%
TOTAL APPLICATIONS SOFTWARE	2498	26%	3145	3908	4757	5792	6908	8084	21%
SYSTEMS SOFTWARE									
APPLICATION DEV TOOLS	539	44%	778	1066	1407	1801	2251	2780	29%
SYSTEMS CONTROL	415	35%	562	759	1024	1378	1847	2466	34%
DATA CENTER MANAGEMENT	23	91%	44	75	115	161	211	265	43%
TOTAL SYSTEMS SOFTWARE	977	42%	1384	1900	2546	3340	4309	5511	32%
GRAND TOTAL	3475	30%	4529	5808	7303	9132	11217	13595	25%

EXHIBIT B-10

SYSTEMS SOFTWARE USER EXPENDITURE FORECAST BY DELIVERY MODE, 1986-1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
APPLICATION DEVELOPMENT TOOLS									
MAINFRAME/MINI	2391	11%	2661	3034	3549	4259	5239	6561	20%
MICRO	539	44%	778	1066	1407	1801	2251	2780	29%
TOTAL APPLICATION DEV. TOOLS	2930	17%	3439	4100	4956	6060	7490	9341	22%
SYSTEMS CONTROL									
MAINFRAME/MINI	2643	28%	3372	4333	5546	7127	9141	11746	28%
MICRO	415	35%	562	759	1024	1378	1847	2466	34%
TOTAL SYSTEMS CONTROL	3058	29%	3934	5092	6570	8505	10988	14212	29%
DATA CENTER MANAGEMENT									
MAINFRAME/MINI	1614	33%	2146	2768	3460	4187	4983	5820	22%
MICRO	23	91%	44	75	115	161	211	265	43%
TOTAL DATA CENTER MANAGEMENT	1637	34%	2190	2843	3575	4348	5194	6085	23%
TOTAL MAINFRAME/MINI	6648	23%	8179	10135	12555	15573	19363	24127	24%
TOTAL MICROCOMPUTER	977	42%	1384	1900	2546	3340	4309	5511	32%
GRAND TOTAL	7625	25%	9563	12035	15101	18913	23672	29638	25%

EXHIBIT B-11

PROFESSIONAL SERVICES FORECAST
BY TYPE OF SERVICE, 1986 - 1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
FEDERAL GOVERNMENT PROFESSIONAL SERVICES									
SOFTWARE DEVELOPMENT	953	12%	1072	1216	1280	1440	1654	1837	11%
CONSULTING	352	5%	371	394	434	451	483	500	6%
EDUCATION & TRAINING	268	11%	298	332	367	396	414	449	9%
SYSTEMS INTEGRATION	897	10%	984	1189	1400	1636	1916	2285	18%
FACILITIES MANAGEMENT	734	7%	788	862	930	998	1074	1180	8%
SUB-TOTAL	3204	10%	3513	3993	4411	4921	5541	6251	12%
COMMERCIAL PROFESSIONAL SERVICES									
SOFTWARE DEVELOPMENT	5488	18%	6483	7368	8452	9662	11040	12634	14%
CONSULTING	1665	25%	2089	2519	3093	3817	4742	5860	23%
EDUCATION & TRAINING	1045	25%	1308	1578	1937	2389	2970	3731	23%
SYSTEMS INTEGRATION									
PROJECT MANAGEMENT	70	43%	100	136	189	263	363	492	38%
DESIGN & INTEGRATION	143	43%	205	279	393	546	756	1037	38%
OPERATIONS & MAINT.	21	43%	30	42	59	85	123	162	40%
SI SOFTWARE DEVELOPMENT	373	42%	528	712	983	1361	1871	2555	37%
SI CONSULTING	86	42%	122	164	227	312	431	587	37%
SI EDUCATION & TRAINING	23	43%	33	46	64	91	130	174	39%
TOTAL SYSTEMS INTEGRATION	716	42%	1018	1379	1915	2658	3674	5007	38%
FACILITIES MANAGEMENT	174	14%	199	222	256	294	338	390	14%
SUB-TOTAL	9088	22%	11097	13066	15653	18820	22764	27622	20%
TOTAL PROFESSIONAL SERVICES									
SOFTWARE DEVELOPMENT	6441	17%	7555	8584	9732	11102	12694	14471	14%
CONSULTING	2017	22%	2460	2913	3527	4268	5225	6360	21%
EDUCATION & TRAINING	1313	22%	1606	1910	2304	2785	3384	4180	21%
SYSTEMS INTEGRATION	1613	24%	2002	2568	3315	4294	5590	7292	30%
FACILITIES MANAGEMENT	908	9%	987	1084	1186	1292	1412	1570	10%
GRAND TOTAL	12292	19%	14610	17059	20064	23741	28305	33873	18%

EXHIBIT B-12

PROFESSIONAL SERVICES USER EXPENDITURE FORECAST BY MARKET SECTOR, 1986 - 1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
DISCRETE MANUFACTURING	1988	30%	2587	3138	3790	4468	5417	6593	21%
PROCESS MANUFACTURING	1054	16%	1226	1347	1707	2279	2909	3715	25%
TRANSPORTATION	149	21%	180	220	270	335	419	526	24%
UTILITIES	305	17%	357	418	480	552	630	718	15%
TELECOMMUNICATIONS	464	28%	594	725	870	1018	1181	1359	18%
DISTRIBUTION	594	20%	714	891	1060	1219	1391	1588	17%
BANKING AND FINANCE	1417	22%	1723	1991	2337	2802	3292	3868	18%
INSURANCE	894	18%	1054	1174	1331	1544	1858	2239	16%
MEDICAL	252	25%	314	376	460	561	690	848	22%
EDUCATION	66	14%	75	78	85	94	105	116	9%
SERVICES	155	19%	184	207	240	283	378	505	22%
FEDERAL GOVERNMENT	3204	10%	3513	3993	4411	4921	5541	6251	12%
STATE AND LOCAL GOVERNMENT	1498	18%	1768	2123	2567	3132	3852	4778	22%
OTHER INDUSTRY-SPECIFIC	252	27%	321	378	456	533	642	769	19%
GRAND TOTAL	12292	19%	14610	17059	20064	23741	28305	33873	18%

EXHIBIT B-13

TURNKEY SYSTEMS USER EXPENDITURE FORECAST BY MARKET SEGMENT, 1986 - 1992

SEGMENTATION	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
INDUSTRY-SPECIFIC									
DISCRETE MANUFACTURING	1662	12%	1861	2066	2272	2499	2749	2997	10%
PROCESS MANUFACTURING	334	10%	367	404	445	490	538	591	10%
TRANSPORTATION	134	12%	150	168	188	211	236	264	12%
UTILITIES	27	15%	31	35	40	46	51	57	13%
TELECOMMUNICATIONS	218	14%	249	283	323	368	420	479	14%
DISTRIBUTION	523	15%	601	685	774	865	962	1059	12%
BANKING AND FINANCE	668	11%	741	823	914	1014	1126	1249	11%
INSURANCE	179	14%	204	233	263	295	327	360	12%
MEDICAL	560	13%	633	707	787	866	944	1019	10%
EDUCATION	96	11%	107	117	124	130	138	143	6%
SERVICES	366	13%	414	460	505	551	595	637	9%
FEDERAL GOVERNMENT	342	13%	388	430	473	512	555	590	9%
STATE AND LOCAL GOVERNMENT	102	15%	117	135	155	178	205	236	15%
OTHER INDUSTRY-SPECIFIC	112	17%	131	151	170	189	206	221	11%
SUB-TOTAL	5323	13%	5994	6697	7433	8214	9052	9902	11%
CROSS-INDUSTRY									
PLANNING AND ANALYSIS	266	7%	284	299	321	342	353	370	5%
ACCOUNTING	394	5%	414	433	459	485	495	514	4%
HUMAN RESOURCES	217	8%	235	251	267	280	291	300	5%
ENGINEERING/SCIENTIFIC	322	10%	354	380	418	451	479	508	7%
EDUCATION/TRAINING	137	9%	149	157	168	177	183	189	5%
OTHER CROSS-INDUSTRY	1140	6%	1208	1268	1332	1398	1468	1542	5%
SUB-TOTAL	2476	7%	2644	2788	2965	3133	3269	3423	5%
GRAND TOTAL	7799	11%	8638	9485	10398	11347	12321	13325	9%

EXHIBIT B-14

BANKING AND FINANCE INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST 1986-1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH	2800	16%	3256	3777	4381	5060	5870	6714	16%
FACILITY MANAGEMENT	990	14%	1131	1289	1469	1675	1910	2151	14%
TOTAL PROCESSING SERVICES	3790	16%	4387	5066	5850	6735	7780	8865	15%
APPLICATION SOFTWARE									
MAINFRAME/MINI	999	19%	1189	1391	1614	1856	2116	2392	15%
MICRO	131	43%	187	256	338	432	534	643	28%
TOTAL APPLICATION SOFTWARE	1130	22%	1376	1647	1952	2288	2650	3035	17%
TURNKEY SYSTEMS	668	11%	741	823	914	1014	1126	1249	11%
SECTOR TOTAL	5588	16%	6504	7536	8716	10037	11556	13149	15%

EXHIBIT B-15

DISCRETE MANUFACTURING INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH	631	15%	726	828	935	1047	1163	1279	12%
FACILITY MANAGEMENT	52	13%	59	67	75	85	96	107	13%
TOTAL PROCESSING SERVICES	683	15%	785	895	1010	1132	1259	1386	12%
APPLICATION SOFTWARE									
MAINFRAME/MINI	857	18%	1011	1183	1372	1578	1799	2033	15%
MICRO	98	73%	170	255	332	398	458	519	25%
TOTAL APPLICATION SOFTWARE	955	24%	1181	1438	1704	1976	2257	2552	17%
TURNKEY SYSTEMS	1662	12%	1861	2066	2272	2499	2749	2997	10%
SECTOR TOTAL	3300	16%	3827	4399	4986	5607	6265	6935	13%

EXHIBIT B-16

DISTRIBUTION INDUSTRY SECTOR - RETAIL AND WHOLESALE
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH	897	16%	1045	1201	1370	1562	1765	1994	14%
FACILITY MANAGEMENT	52	10%	57	64	73	84	98	115	15%
TOTAL PROCESSING SERVICES	949	16%	1102	1265	1443	1646	1863	2109	14%
APPLICATION SOFTWARE									
MAINFRAME/MINI	294	20%	353	416	483	555	633	710	15%
MICRO	115	41%	162	222	297	390	499	625	31%
TOTAL APPLICATION SOFTWARE	409	26%	515	638	780	945	1132	1335	21%
TURNKEY SYSTEMS	523	15%	601	685	774	865	962	1059	12%
SECTOR TOTAL	1881	18%	2218	2588	2997	3456	3957	4503	15%

EXHIBIT B-17

DISTRIBUTION INDUSTRY SECTOR - RETAIL

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING SERVICES									
REMOTE COMP/BATCH	564	17%	659	771	894	1029	1173	1325	15%
FACILITY MANAGEMENT	16	13%	18	20	23	26	31	35	14%
TOTAL PROCESSING SERVICES	580	17%	677	791	917	1055	1204	1360	15%
APPLICATION SOFTWARE									
MAINFRAME/MINI	72	32%	95	123	156	195	239	290	25%
MICRO	32	47%	47	63	84	113	154	211	35%
TOTAL APPLICATION SOFTWARE	104	37%	142	186	240	308	393	501	29%
TURNKEY SYSTEMS	227	30%	295	366	439	509	573	630	16%
TOTAL	911	22%	1114	1343	1596	1872	2170	2491	17%

EXHIBIT B-18

DISTRIBUTION INDUSTRY SECTOR - WHOLESALE

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING SERVICES									
REMOTE COMP/BATCH	333	16%	386	430	476	533	592	669	12%
FACILITY MANAGEMENT	36	8%	39	44	50	58	67	80	15%
TOTAL PROCESSING SERVICES	369	15%	425	474	526	591	659	749	12%
APPLICATION SOFTWARE									
MAINFRAME/MINI	222	16%	258	293	327	360	394	420	10%
MICRO	83	39%	115	159	213	277	345	414	29%
TOTAL APPLICATION SOFTWARE	305	22%	373	452	540	637	739	834	17%
TURNKEY SYSTEMS	296	3%	306	319	335	356	389	429	7%
TOTAL	970	14%	1104	1245	1401	1584	1787	2012	13%

EXHIBIT B-19

EDUCATION INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH	114	12%	128	142	158	175	193	212	11%
FACILITY MANAGEMENT	20	5%	21	21	21	22	22	22	1%
TOTAL PROCESSING SERVICES	134	11%	149	163	179	197	215	234	9%
APPLICATION SOFTWARE									
MAINFRAME/MINI	30	17%	35	40	46	52	59	66	14%
MICRO	57	23%	70	84	99	115	131	147	16%
TOTAL APPLICATION SOFTWARE	87	21%	105	124	145	167	190	213	15%
TURNKEY SYSTEMS	96	11%	107	117	124	130	138	143	6%
SECTOR TOTAL	317	14%	361	404	448	494	543	590	10%

EXHIBIT B-20

FEDERAL GOVERNMENT INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH SVCS	323	8%	350	341	357	373	391	408	3%
FACILITY MANAGEMENT	213	5%	223	247	263	286	311	337	9%
TOTAL PROCESSING SERVICES	536	7%	573	588	620	659	702	745	5%
APPLICATION SOFTWARE									
MAINFRAME/MINI	59	19%	70	83	98	124	152	183	21%
MICRO	15	13%	17	20	22	29	35	41	19%
TOTAL APPLICATION SOFTWARE	74	18%	87	103	120	153	187	224	21%
TURNKEY SYSTEMS	342	13%	388	430	473	512	555	590	9%
SECTOR TOTAL	952	10%	1048	1121	1213	1324	1444	1559	8%

OTHER EXPENDITURE BREAKDOWN

PROFESSIONAL SERVICES									
SOFTWARE DEVELOPEMENT	953	12%	1072	1216	1280	1440	1654	1837	11%
CONSULTING	352	5%	371	394	434	451	483	500	6%
EDUCATION & TRAINING	268	11%	298	332	367	396	414	449	9%
SYSTEMS INTEGRATION	897	10%	984	1189	1400	1636	1916	2285	18%
FACILITY MANAGEMENT	734	7%	788	862	930	998	1074	1180	8%
TOTAL PROFESSIONAL SERVICES	3204	10%	3513	3993	4411	4921	5541	6251	12%

EXHIBIT B-21

INSURANCE INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH	344	15%	395	450	509	570	638	707	12%
FACILITY MANAGEMENT	361	10%	397	437	480	528	581	639	10%
TOTAL PROCESSING SERVICES	705	12%	792	887	989	1098	1219	1346	11%
APPLICATION SOFTWARE									
MAINFRAME/MINI	282	19%	335	395	458	527	601	687	15%
MICRO	109	35%	147	191	241	294	353	431	24%
TOTAL APPLICATION SOFTWARE	391	23%	482	586	699	821	954	1118	18%
TURNKEY SYSTEMS	179	14%	204	233	263	295	327	360	12%
SECTOR TOTAL	1275	16%	1478	1706	1951	2214	2500	2824	14%

EXHIBIT B-22

MEDICAL INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE/BATCH SVCS	719	18%	847	999	1169	1356	1560	1805	16%
FACILITY MANAGEMENT	383	15%	442	504	569	643	721	811	13%
TOTAL PROCESSING SERVICES	1102	17%	1289	1503	1738	1999	2281	2616	15%
APPLICATION SOFTWARE									
MAINFRAME/MINI	389	25%	486	593	712	840	974	1112	18%
MICRO	78	38%	108	141	178	217	258	304	23%
TOTAL APPLICATION SOFTWARE	467	27%	594	734	890	1057	1232	1416	19%
TURNKEY SYSTEMS	560	13%	633	707	787	866	944	1019	10%
SECTOR TOTAL	2129	18%	2516	2944	3415	3922	4457	5051	15%

EXHIBIT B-23

PROCESS MANUFACTURING INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH	761	16%	880	1012	1159	1321	1493	1673	14%
FACILITY MANAGEMENT	44	7%	47	49	51	53	54	55	3%
TOTAL PROCESSING SERVICES	805	15%	927	1061	1210	1374	1547	1728	13%
APPLICATION SOFTWARE									
MAINFRAME/MINI	106	11%	118	130	142	153	166	178	9%
MICRO	32	6%	34	37	41	45	50	56	10%
TOTAL APPLICATION SOFTWARE	138	10%	152	167	183	198	216	234	9%
TURNKEY SYSTEMS	334	10%	367	404	445	490	538	591	10%
SECTOR TOTAL	1277	13%	1446	1632	1838	2062	2301	2553	12%

EXHIBIT B-24

SERVICES INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH	984	15%	1128	1286	1466	1657	1856	2050	13%
FACILITY MANAGEMENT	7	8%	8	9	9	10	10	11	8%
TOTAL PROCESSING SERVICES	991	15%	1136	1295	1475	1667	1866	2061	13%
APPLICATION SOFTWARE									
MAINFRAME/MINI	112	25%	140	174	214	261	313	372	22%
MICRO	32	28%	41	52	66	83	104	130	26%
TOTAL APPLICATION SOFTWARE	144	26%	181	226	280	344	417	502	23%
TURNKEY SYSTEMS	366	13%	414	460	505	551	595	637	9%
SECTOR TOTAL	1501	15%	1731	1981	2260	2562	2878	3200	13%

EXHIBIT B-25

STATE AND LOCAL GOVERNMENT INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH	134	22%	164	198	240	291	352	424	21%
FACILITY MANAGEMENT	347	17%	406	467	528	591	656	722	12%
TOTAL PROCESSING SERVICES	481	19%	570	665	768	882	1008	1146	15%
APPLICATION SOFTWARE									
MAINFRAME/MINI	41	22%	50	60	71	84	99	115	18%
MICRO	14	29%	18	23	29	35	43	53	24%
TOTAL APPLICATION SOFTWARE	55	24%	68	83	100	119	142	168	20%
TURNKEY SYSTEMS	102	15%	117	135	155	178	205	236	15%
SECTOR TOTAL	638	18%	755	883	1023	1179	1355	1550	15%

EXHIBIT B-26

TELECOMMUNICATIONS INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH	400	22%	487	584	695	821	960	1098	18%
FACILITY MANAGEMENT	20	15%	23	27	31	36	42	49	16%
TOTAL PROCESSING SERVICES	420	21%	510	611	726	857	1002	1147	18%
APPLICATION SOFTWARE									
MAINFRAME/MINI	61	48%	90	125	165	208	252	297	27%
MICRO	12	42%	17	25	36	53	78	117	47%
TOTAL APPLICATION SOFTWARE	73	47%	107	150	201	261	330	414	31%
TURNKEY SYSTEMS	218	14%	249	283	323	368	420	479	14%
SECTOR TOTAL	711	22%	866	1044	1250	1486	1752	2040	19%

EXHIBIT B-27

TRANSPORTATION INDUSTRY SECTOR
INDUSTRY SPECIFIC USER EXPENDITURE FORECAST 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH	212	11%	236	269	312	365	431	506	16%
FACILITY MANAGEMENT	27	4%	28	29	29	29	30	30	1%
TOTAL PROCESSING SERVICES	239	10%	264	298	341	394	461	536	15%
APPLICATION SOFTWARE									
MAINFRAME/MINI	140	24%	173	213	260	314	374	442	21%
MICRO	34	56%	53	73	94	112	130	149	23%
TOTAL APPLICATION SOFTWARE	174	30%	226	286	354	426	504	591	21%
TURNKEY SYSTEMS	134	12%	150	168	188	211	236	264	12%
SECTOR TOTAL	547	17%	640	752	883	1031	1201	1391	17%

EXHIBIT B-28

UTILITIES INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH	119	10%	131	145	161	177	194	214	10%
FACILITY MANAGEMENT	21	10%	23	26	29	32	36	41	12%
TOTAL PROCESSING SERVICES	140	10%	154	171	190	209	230	255	11%
APPLICATION SOFTWARE									
MAINFRAME/MINI	88	17%	103	121	142	164	190	219	16%
MICRO	42	26%	53	67	84	105	130	162	25%
TOTAL APPLICATION SOFTWARE	130	20%	156	188	226	269	320	381	20%
TURNKEY SYSTEMS	27	15%	31	35	40	46	51	57	13%
SECTOR TOTAL	297	15%	341	394	456	524	601	693	15%

EXHIBIT B-29

'OTHER INDUSTRIES' INDUSTRY SECTOR
INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
PROCESSING/NETWORK SERVICES									
REMOTE COMP/BATCH SVCS	561	14%	637	713	792	871	950	1032	10%
FACILITY MANAGEMENT	10	10%	11	12	13	15	16	18	10%
TOTAL PROCESSING SERVICES	571	13%	648	725	805	886	966	1050	10%
APPLICATION SOFTWARE									
MAINFRAME/MINI	88	36%	120	155	190	226	262	299	20%
MICRO	9	56%	14	21	32	46	66	93	46%
TOTAL APPLICATION SOFTWARE	97	38%	134	176	222	272	328	392	24%
TURNKEY SYSTEMS	112	17%	131	151	170	189	206	221	11%
SECTOR TOTAL	780	17%	913	1052	1197	1347	1500	1663	13%

EXHIBIT B-30

ACCOUNTING CROSS-INDUSTRY USER EXPENDITURE FORECAST
BY DELIVERY MODE, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
REMOTE COMP/BATCH	988	4%	1024	1048	1086	1105	1132	1142	2%
APPLICATION SOFTWARE									
MAINFRAME/MINI	883	13%	995	1121	1248	1360	1470	1567	10%
MICRO	281	21%	339	412	493	576	641	692	15%
TOTAL APPLICATION SOFTWARE	1164	15%	1334	1533	1741	1936	2111	2259	11%
TURNKEY SYSTEMS	394	5%	414	433	459	485	495	514	4%
CROSS-INDUSTRY TOTAL	2546	9%	2772	3014	3286	3526	3738	3915	7%

EXHIBIT B-31

EDUCATION AND TRAINING CROSS-INDUSTRY USER EXPENDITURE FORECAST
BY DELIVERY MODE, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
REMOTE COMPUTING/BATCH	84	11%	93	104	113	119	127	132	7%
APPLICATION SOFTWARE									
MAINFRAME/MINI	37	30%	48	58	71	84	95	109	18%
MICRO	50	28%	64	79	94	119	148	177	23%
TOTAL APPLICATION SOFTWARE	87	29%	112	137	165	203	243	286	21%
TURNKEY SYSTEMS	137	9%	149	157	168	177	183	189	5%
CROSS-INDUSTRY TOTAL	308	15%	354	398	446	499	553	607	11%

EXHIBIT B-32

ENGINEERING AND SCIENTIFIC CROSS-INDUSTRY USER EXPENDITURE FORECAST
BY DELIVERY MODE, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
REMOTE COMPUTING/BATCH	247	6%	263	281	297	309	327	339	5%
APPLICATION SOFTWARE									
MAINFRAME/MINI	186	28%	239	306	388	480	589	713	24%
MICRO	42	31%	55	73	95	126	162	201	30%
TOTAL APPLICATION SOFTWARE	228	29%	294	379	483	606	751	914	25%
TURNKEY SYSTEMS	322	10%	354	380	418	451	479	508	7%
CROSS-INDUSTRY TOTAL	797	14%	911	1040	1198	1366	1557	1761	14%

EXHIBIT B-33

HUMAN RESOURCES CROSS-INDUSTRY USER EXPENDITURE FORECAST
BY DELIVERY MODE, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
REMOTE COMPUTING/BATCH	932	14%	1061	1221	1386	1552	1746	1934	13%
APPLICATION SOFTWARE									
MAINFRAME/MINI	485	20%	582	673	732	764	778	783	6%
MICRO	37	24%	46	57	67	84	100	115	20%
TOTAL APPLICATION SOFTWARE	522	20%	628	730	799	848	878	898	7%
TURNKEY SYSTEMS	217	8%	235	251	267	280	291	300	5%
CROSS-INDUSTRY TOTAL	1671	15%	1924	2202	2452	2680	2915	3132	10%

EXHIBIT B-34

PLANNING AND ANALYSIS CROSS-INDUSTRY USER EXPENDITURE FORECAST
BY MARKET SEGMENT, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
REMOTE COMPUTING/BATCH	235	0%	235	239	235	234	232	229	-1%
APPLICATION SOFTWARE									
MAINFRAME/MINI	663	11%	735	838	944	1050	1164	1273	12%
MICRO	775	16%	896	1012	1121	1306	1444	1546	12%
TOTAL APPLICATION SOFTWARE	1438	13%	1631	1850	2065	2356	2608	2819	12%
TURNKEY SYSTEMS	266	7%	284	299	321	342	353	370	5%
CROSS-INDUSTRY TOTAL	1939	11%	2150	2388	2621	2932	3193	3418	10%

EXHIBIT B-35

OTHER CROSS-INDUSTRY USER EXPENDITURE FORECAST
BY DELIVERY MODE, 1986 - 1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92
REMOTE COMPUTING/BATCH	602	5%	634	676	708	743	791	828	5%
APPLICATION SOFTWARE									
MAINFRAME/MINI	263	24%	327	409	523	653	792	947	24%
MICRO	535	22%	654	808	998	1227	1544	1883	24%
TOTAL APPLICATION SOFTWARE	798	23%	981	1217	1521	1880	2336	2830	24%
TURNKEY SYSTEMS	1140	6%	1208	1268	1332	1398	1468	1542	5%
CROSS-INDUSTRY TOTAL	2540	11%	2823	3161	3561	4021	4595	5200	13%

EO-C

Appendix: Forecast Data Base Reconciliation

C

Appendix: Forecast Data Base Reconciliation

As part of the forecast process each year, INPUT rolls forward by one year its five-year forecast. The forecast data base reconciliation describes the major differences between the forecasted values from the current reports and those recorded 12 earlier months. Thus in 1986 user expenditures for different segments of the information services market were forecast for 1986 and the five years following through 1991. In 1987, the projection covered 1987 and the following five years (through 1992).

In 1987 INPUT captured (through its interview process) the "final" values for 1986, forecast the values for 1987, and extrapolated through 1992. This reconciliation compares the values forecasted for 1986 during 1986, with those reported (or finalized) in 1987 for what actually occurred in 1986.

Similarly the values forecast for 1991 from the work performed in 1986 are compared with the 1987 forecast for 1991. Significant differences are explained below.

The inflation rates reported in 1986 were adjusted to reflect the Department of Commerce forecast for 1987 through 1992. This adjustment accounted for an across-the-board average drop of 1.6% in the five-year annual growth rate. (Note: INPUT's forecasts are in current dollars.)

A
Delivery Mode Analysis

1. Processing Network Services

The most significant difference is in the shifting of some remote computing/batch revenue to the federal government sector from cross-industry remote computing/batch to account more accurately for applications in the federal sector that were incorrectly classified as cross-industry. Approximately $215 million was transferred.

2. Software Products

In the short term, several industry-specific applications were identified that were previously unaccounted for, adding approximately $260 million to this sector. Part of this revenue came from what was being forecast as turnkey systems, as these vendors are also selling software to users that already have the required platform in place.

3. Professional Services

No major overall changes to report. There were some small changes in that some revenue reported under federal systems integration was actually state and local government. This shift accounted for approximately $62 million. In addition, some previously unreported revenue in utilities accounted for an increase of $190 million.

4. Turnkey Systems

INPUT identified a shift in industry-specific revenues to software products, combined with a slowing of user expenditures due to the beginning of saturation in large vertical-market areas such as automobile applications, CAD/CAM/CAE, and medical.

EXHIBIT C-1

DATA BASE RECONCILIATION OF TOTAL INFORMATION SERVICES USER EXPENDITURE FORECAST BY DELIVERY MODE, 1987 - 1992

	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST	87-92 AAGR FORECAST
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	IN '86 REPORT (%)	IN '87 REPORT (%)
REMOTE COMPUTING/BATCH								
INDUSTRY SPECIFIC	8614	8999	-4%	17134	17816	-4%	15%	14%
CROSS INDUSTRY	4172	3921	6%	7069	6732	5%	11%	11%
UTILITY PROCESSING	2221	2221	0%	3109	3153	-1%	7%	7%
SUBTOTAL	15007	15141	-1%	27312	27701	-1%	13%	12%
FACILITIES MANAGEMENT								
INDUSTRY SPECIFIC	2523	2547	-1%	4860	4583	6%	14%	12%
CROSS INDUSTRY	62	62	0%	76	66	15%	4%	2%
UTILITY PROCESSING	181	181	0%	392	343	14%	17%	13%
SUBTOTAL	2766	2790	-1%	5328	4992	7%	14%	12%
TOTAL PROCESSING SERVICES								
INDUSTRY SPECIFIC	11137	11546	-4%	21994	22399	-2%	15%	14%
CROSS INDUSTRY	4234	3983	6%	7145	6798	5%	11%	11%
UTILITY PROCESSING	2402	2402	0%	3501	3496	0%	8%	7%
VANS	409	409	0%	1393	1414	-1%	28%	26%

EXHIBIT C-2

SYSTEMS SOFTWARE - DATA BASE RECONCILIATION OF MARKET FORECAST BY TYPE OF SOFTWARE

	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST	87-92 AAGR FORECAST
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	IN '86 REPORT (%)	IN '87 REPORT (%)
APPLICATION DEVELOPMENT TOOLS								
MAINFRAME/MINI	2352	2391	-2%	5200	5239	-1%	17%	20%
MICRO	530	539	-2%	2210	2251	-2%	33%	29%
TOTAL APPLICATION DEV. TOOLS	2882	2930	-2%	7410	7490	-1%	21%	22%
SYSTEMS CONTROL								
MAINFRAME/MINI	2600	2643	-2%	7520	9141	-18%	24%	28%
MICRO	408	415	-2%	1892	1847	2%	36%	34%
TOTAL SYSTEMS CONTROL	3008	3058	-2%	9412	10988	-14%	26%	29%
DATA CENTER MANAGEMENT								
MAINFRAME/MINI	1588	1614	-2%	4700	4983	-6%	24%	22%
MICRO	23	23	0%	440	211	109%	80%	43%
TOTAL DATA CENTER MANAGEMENT	1611	1637	-2%	5140	5194	-1%	26%	23%
TOTAL MAINFRAME/MINI	6540	6648	-2%	17420	19363	-10%	22%	24%
TOTAL MICROCOMPUTER	961	977	-2%	4542	4309	5%	36%	32%
GRAND TOTAL	7501	7625	-2%	21962	23672	-7%	24%	25%

EXHIBIT C-3

PROFESSIONAL SERVICES - DATA BASE RECONCILIATION
OF MARKET FORECAST, BY TYPE OF SERVICE

	1986 MARKET			1991 MARKET			86-91 AAGR	87-92 AAGR
	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	FORECAST IN '86 REPORT (%)	FORECAST IN '87 REPORT (%)
FEDERAL GOVERNMENT P.F.S.								
SOFTWARE DEVELOPMENT	961	953	1%	3248	1654	96%	28%	11%
CONSULTING	355	352	1%	717	483	48%	15%	6%
EDUCATION & TRAINING	270	268	1%	807	414	95%	24%	9%
SYSTEMS INTEGRATION	904	897	1%	2162	1916	13%	19%	18%
FACILITIES MANAGEMENT	740	734	1%	910	1074	-15%	4%	8%
SUB-TOTAL	3230	3204	1%	7844	5541	42%	19%	12%
COMMERCIAL P.F.S.								
SOFTWARE DEVELOPMENT	5768	5488	5%	12005	11040	9%	16%	14%
CONSULTING	1709	1665	3%	3634	4742	-23%	16%	23%
EDUCATION & TRAINING	1052	1045	1%	2545	2970	-14%	19%	23%
SYSTEMS INTEGRATION	608	716			3674			38%
FACILITIES MANAGEMENT	175	174	1%	287	338	-15%	10%	14%
SUB-TOTAL	9312	9088	2%	18471	22764	-19%	15%	20%
TOTAL PROFESSIONAL SERVICES								
SOFTWARE DEVELOPMENT	6729	6441	4%	15253	12694	20%	18%	14%
CONSULTING	2064	2017	2%	4351	5225	-17%	16%	21%
EDUCATION & TRAINING	1322	1313	1%	3352	3384	-1%	20%	21%
SYSTEMS INTEGRATION	1512	1613	-6%	2162	5590	-61%	7%	30%
FACILITIES MANAGEMENT	915	908	1%	1197	1412	-15%	6%	10%
GRAND TOTAL	12542	12292	2%	26315	28305	-7%	16%	18%

EXHIBIT C-4

PROFESSIONAL SERVICES - DATA BASE RECONCILIATION OF MARKET FORECAST, BY INDUSTRY SECTOR

	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST		
DISCRETE MANUFACTURING	2089	1988	5%	5688	5417	5%	22%	21%
PROCESS MANUFACTURING	1109	1054	5%	3055	2909	5%	22%	25%
TRANSPORTATION	157	149	5%	407	419	-3%	21%	24%
UTILITIES	74	305	-76%	112	630	-82%	9%	15%
TELECOMMUNICATIONS	489	464	5%	1392	1181	18%	23%	18%
DISTRIBUTION	625	594	5%	1460	1391	5%	18%	17%
BANKING AND FINANCE	1490	1417	5%	3456	3292	5%	18%	18%
INSURANCE	940	894	5%	1950	1858	5%	16%	16%
MEDICAL	266	252	6%	724	690	5%	22%	22%
EDUCATION	70	66	6%	110	105	5%	9%	9%
SERVICES	163	155	5%	397	378	5%	19%	22%
FEDERAL GOVERNMENT	3230	3204	1%	5536	5541	0%	11%	12%
STATE AND LOCAL GOVERNMENT	1575	1498	5%	3775	3852	-2%	19%	22%
OTHER INDUSTRY-SPECIFIC	265	252	5%	673	642	5%	20%	19%
TOTAL	12542	12292	2%	28735	28305	2%	18%	18%

EXHIBIT C-5

BANKING AND FINANCE - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET				
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	2757	2800	-2%	5470	5870	-7%	15%	16%
FACILITY MANAGEMENT	980	990	-1%	1975	1910	3%	15%	14%
TOTAL PROCESSING SERVICES	3737	3790	-1%	7445	7780	-4%	15%	15%
APPLICATION SOFTWARE	1061	1130	-6%	3010	2650	14%	23%	17%
TURNKEY SYSTEMS	720	668	8%	1440	1126	28%	15%	11%
INDUSTRY-SPECIFIC SEGMENT TOTAL	5518	5588	-1%	11895	11556	3%	17%	15%

EXHIBIT C-6

DISCRETE MANUFACTURING - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET				
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	621	631	-2%	1470	1163	26%	19%	12%
FACILITY MANAGEMENT	51	52	-2%	107	96	11%	16%	13%
TOTAL PROCESSING SERVICES	672	683	-2%	1577	1259	25%	19%	12%
APPLICATION SOFTWARE	897	955	-6%	2686	2257	19%	25%	17%
TURNKEY SYSTEMS	1792	1662	8%	4724	2749	72%	21%	10%
INDUSTRY-SPECIFIC SEGMENT TOTAL	3361	3300	2%	8987	6265	43%	22%	13%

EXHIBIT C-7

DISTRIBUTION - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST		
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	883	897	-2%	1767	1765	0%	15%	14%
FACILITY MANAGEMENT	51	52	-2%	73	98	-26%	7%	15%
TOTAL PROCESSING SERVICES	934	949	-2%	1840	1863	-1%	15%	14%
APPLICATION SOFTWARE	383	409	-6%	1366	1132	21%	29%	21%
TURNKEY SYSTEMS	564	523	8%	1294	962	35%	18%	12%
INDUSTRY-SPECIFIC SEGMENT TOTAL	1881	1881	0%	4500	3957	14%	19%	139

EXHIBIT C-8

EDUCATION - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST		
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	112	114	-2%	188	193	-3%	11%	11%
FACILITY MANAGEMENT	20	20	0%	25	22	14%	5%	1%
TOTAL PROCESSING SERVICES	132	134	-1%	213	215	-1%	10%	9%
APPLICATION SOFTWARE	81	87	-7%	178	190	-6%	17%	15%
TURNKEY SYSTEMS	103	96	7%	201	138	46%	14%	6%
INDUSTRY-SPECIFIC SEGMENT TOTAL	316	317	0%	592	543	9%	13%	10%

EXHIBIT C-9

FEDERAL GOVERNMENT - DATA BASE RECONCILIATION
OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR	87-92 AAGR
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	FORECAST IN '86 REPORT (%)	FORECAST IN '87 REPORT (%)
TOTAL PROCESSING SERVICES	285	536	-47%	432	702	-38%	9%	5%
TOTAL APPLICATION SOFTWARE	74	74	0%	162	187	-13%	17%	21%
TURNKEY SYSTEMS	342	342	0%	846	555	52%	20%	9%
INDUSTRY-SPECIFIC SEGMENT TOTAL	701	952	-26%	1440	1444	0%	15%	8%

EXHIBIT C-10

INSURANCE - DATA BASE RECONCILIATION
OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR	87-92 AAGR
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	FORECAST IN '86 REPORT (%)	FORECAST IN '87 REPORT (%)
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	339	344	-1%	626	638	-2%	13%	12%
FACILITY MANAGEMENT	357	361	-1%	619	581	7%	12%	10%
TOTAL PROCESSING SERVICES	696	705	-1%	1245	1219	2%	12%	11%
APPLICATION SOFTWARE	366	391	-6%	870	954	-9%	19%	18%
TURNKEY SYSTEMS	193	179	8%	480	327	47%	20%	12%
INDUSTRY-SPECIFIC SEGMENT TOTAL	1255	1275	-2%	2595	2500	4%	16%	14%

EXHIBIT C-11

MEDICAL - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

DELIVERY MODE	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST		
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	708	719	-2%	1516	1560	-3%	16%	16%
FACILITY MANAGEMENT	379	383	-1%	816	721	13%	17%	13%
TOTAL PROCESSING SERVICES	1087	1102	-1%	2332	2281	2%	16%	15%
APPLICATION SOFTWARE	438	467	-6%	2167	1232	76%	38%	19%
TURNKEY SYSTEMS	604	560	8%	1394	944	48%	18%	10%
INDUSTRY-SPECIFIC SEGMENT TOTAL	2129	2129	0%	5893	4457	32%	23%	15%

EXHIBIT C-12

PROCESS MANUFACTURING - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

DELIVERY MODE	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST		
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	749	761	-2%	1442	1493	-3%	14%	14%
FACILITY MANAGEMENT	44	44	0%	62	54	15%	7%	3%
TOTAL PROCESSING SERVICES	793	805	-1%	1504	1547	-3%	14%	13%
APPLICATION SOFTWARE	130	138	-6%	194	216	-10%	8%	9%
TURNKEY SYSTEMS	360	334	8%	580	538	8%	10%	10%
INDUSTRY-SPECIFIC SEGMENT TOTAL	1283	1277	0%	2278	2301	-1%	12%	12%

EXHIBIT C-13

SERVICES - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST	87-92 AAGR FORECAST
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	IN '86 REPORT (%)	IN '87 REPORT (%)
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	969	984	-2%	1785	1856	-4%	13%	13%
FACILITY MANAGEMENT	7	7	0%	8	10	-20%	3%	8%
TOTAL PROCESSING SERVICES	976	991	-2%	1793	1866	-4%	13%	13%
APPLICATION SOFTWARE	135	144	-6%	370	417	-11%	22%	23%
TURNKEY SYSTEMS	395	366	8%	880	595	48%	17%	9%
INDUSTRY-SPECIFIC SEGMENT TOTAL	1506	1501	0%	3043	2878	6%	15%	13%

EXHIBIT C-14

STATE/LOCAL GOVERNMENT - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST	87-92 AAGR FORECAST
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	IN '86 REPORT (%)	IN '87 REPORT (%)
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	132	134	-1%	328	424	-23%	20%	21%
FACILITY MANAGEMENT	343	347	-1%	710	722	-2%	16%	12%
TOTAL PROCESSING SERVICES	475	481	-1%	1038	1146	-9%	17%	15%
APPLICATION SOFTWARE	52	55	-5%	120	168	-29%	18%	20%
TURNKEY SYSTEMS	110	102	8%	272	236	15%	20%	15%
INDUSTRY-SPECIFIC SEGMENT TOTAL	637	638	0%	1430	1550	-8%	18%	15%

EXHIBIT C-15

TELECOMMUNICATIONS - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

DELIVERY MODE	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST		
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	394	400	-2%	910	960	-5%	18%	18%
FACILITY MANAGEMENT	20	20	0%	50	42	19%	20%	16%
TOTAL PROCESSING SERVICES	414	420	-1%	960	1002	-4%	18%	18%
APPLICATION SOFTWARE	68	73	-7%	363	330	10%	40%	31%
TURNKEY SYSTEMS	235	218	8%	606	420	44%	21%	14%
INDUSTRY-SPECIFIC SEGMENT TOTAL	717	711	1%	1929	1752	10%	22%	19%

EXHIBIT C-16

TRANSPORTATION - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

DELIVERY MODE	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST		
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	209	212	-1%	427	506	-16%	15%	16%
FACILITY MANAGEMENT	27	27	0%	34	30	13%	5%	1%
TOTAL PROCESSING SERVICES	236	239	-1%	461	536	-14%	14%	15%
APPLICATION SOFTWARE	163	174	-6%	447	591	-24%	22%	21%
TURNKEY SYSTEMS	145	134	8%	358	264	36%	20%	12%
INDUSTRY-SPECIFIC SEGMENT TOTAL	544	547	-1%	1266	1391	-9%	18%	17%

EXHIBIT C-17

UTILITIES - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST	87-92 AAGR FORECAST
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	IN '86 REPORT (%)	IN '87 REPORT (%)
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	117	119	-2%	181	194	-7%	9%	10%
FACILITY MANAGEMENT	21	21	0%	38	36	6%	13%	12%
TOTAL PROCESSING SERVICES	138	140	-1%	219	230	-5%	10%	11%
APPLICATION SOFTWARE	122	130	-6%	267	320	-17%	17%	20%
TURNKEY SYSTEMS	29	27	7%	51	51	0%	12%	13%
INDUSTRY-SPECIFIC SEGMENT TOTAL	289	297	-3%	537	601	-11%	13%	15%

EXHIBIT C-18

OTHER INDUSTRY SPECIFIC - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST	87-92 AAGR FORECAST
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	IN '86 REPORT (%)	IN '8 REPOR (%)
PROCESSING SERVICES								
REMOTE COMPUTING/BATCH SERV.	552	561	-2%	922	950	-3%	11%	10%
FACILITY MANAGEMENT	10	10	0%	13	16	-19%	5%	10%
TOTAL PROCESSING SERVICES	562	571	-2%	935	966	-3%	11%	10%
APPLICATION SOFTWARE	91	97	-6%	363	328	11%	32%	24%
TURNKEY SYSTEMS	121	112	8%	295	206	43%	20%	11%
INDUSTRY-SPECIFIC SEGMENT TOTAL	774	780	-1%	1593	1500	6%	16%	13%

EXHIBIT C-19

ACCOUNTING SEGMENT- DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST		
REMOTE COMPUTING/BATCH SERV.	1051	988	6%	1160	1132	2%	2%	2%
APPLICATION SOFTWARE								
MAINFRAME/MINI	883	883	0%	1359	1470	-8%	9%	10%
MICRO	281	281	0%	642	641	0%	18%	15%
TOTAL APPLICATION SOFTWARE	1164	1164	0%	2001	2111	-5%	11%	11%
TURNKEY SYSTEMS	394	394	0%	600	495	21%	9%	4%
CROSS-INDUSTRY SEGMENT TOTAL	2609	2546	2%	3761	3915	-4%	8%	7%

EXHIBIT C-20

EDUC/TRAIN SEGMENT - DATA BASE RECONCILIATION OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST		
REMOTE COMPUTING/BATCH SERV.	89	84	6%	148	127	17%	11%	7%
APPLICATION SOFTWARE								
MAINFRAME/MINI	37	37	0%	138	95	45%	30%	18%
MICRO	50	50	0%	383	148	159%	50%	23%
TOTAL APPLICATION SOFTWARE	87	87	0%	521	243	114%	43%	21%
TURNKEY SYSTEMS	137	137	0%	235	183	28%	11%	5%
CROSS-INDUSTRY SEGMENT TOTAL	313	308	2%	904	553	63%	24%	11%

EXHIBIT C-21

ENG/SCIENTIFIC SEGMENT - DATA BASE RECONCILIATION
OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR	87-92 AAGR
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	FORECAST IN '86 REPORT (%)	FORECAST IN '87 REPORT (%)
REMOTE COMPUTING/BATCH SERV.	263	247	6%	335	327	2%	5%	5%
APPLICATION SOFTWARE								
MAINFRAME/MINI	186	186	0%	545	589	-7%	24%	24%
MICRO	42	42	0%	162	162	0%	31%	30%
TOTAL APPLICATION SOFTWARE	228	228	0%	707	751	-6%	25%	25%
TURNKEY SYSTEMS	322	322	0%	648	479	35%	15%	7%
CROSS-INDUSTRY SEGMENT TOTAL	813	797	2%	1690	1761	-4%	16%	14%

EXHIBIT C-22

HUMAN RESOURCES SEGMENT - DATA BASE RECONCILIATION
OF MARKET FORECAST, BY DELIVERY MODE

	1986 MARKET			1991 MARKET			86-91 AAGR	87-92 AAGR
DELIVERY MODE	1986 FORECAST ($M)	1987 REPORT ($M)	VARIANCE AS % OF '87 RPT	1986 FORECAST ($M)	1987 FORECAST ($M)	VARIANCE AS % OF '87 FCST	FORECAST IN '86 REPORT (%)	FORECAST IN '87 REPORT (%)
REMOTE COMPUTING/BATCH SERV.	992	932	6%	1789	1746	2%	13%	13%
APPLICATION SOFTWARE								
MAINFRAME/MINI	485	485	0%	720	778	-7%	8%	6%
MICRO	37	37	0%	100	100	0%	22%	20%
TOTAL APPLICATION SOFTWARE	522	522	0%	820	878	-7%	9%	7%
TURNKEY SYSTEMS	217	217	0%	365	291	25%	11%	5%
CROSS-INDUSTRY SEGMENT TOTAL	1731	1671	4%	2974	2915	2%	11%	10%

EXHIBIT C-23

PLANNING & ANALYSIS SEGMENT - DATA BASE RECONCILIATION
OF MARKET FORECAST, BY DELIVERY MODE

DELIVERY MODE	1986 MARKET 1986 FORECAST ($M)	1986 MARKET 1987 REPORT ($M)	1986 MARKET VARIANCE AS % OF '87 RPT	1991 MARKET 1986 FORECAST ($M)	1991 MARKET 1987 FORECAST ($M)	1991 MARKET VARIANCE AS % OF '87 FCST	86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
REMOTE COMPUTING/BATCH SERV.	250	235	6%	225	232	-3%	-2%	-1%
APPLICATION SOFTWARE								
MAINFRAME/MINI	663	663	0%	1076	1164	-8%	10%	12%
MICRO	775	775	0%	1445	1444	0%	13%	12%
TOTAL APPLICATION SOFTWARE	1438	1438	0%	2521	2608	-3%	12%	12%
TURNKEY SYSTEMS	266	266	0%	425	353	20%	10%	5%
CROSS-INDUSTRY SEGMENT TOTAL	1954	1939	1%	3171	3193	-1%	10%	10%

EXHIBIT C-24

OTHER CROSS-INDUSTRY SEGMENT - DATA BASE RECONCILIATION
OF MARKET FORECAST, BY DELIVERY MODE

DELIVERY MODE	1986 MARKET 1986 FORECAST ($M)	1986 MARKET 1987 REPORT ($M)	1986 MARKET VARIANCE AS % OF '87 RPT	1991 MARKET 1986 FORECAST ($M)	1991 MARKET 1987 FORECAST ($M)	1991 MARKET VARIANCE AS % OF '87 FCST	86-91 AAGR FORECAST IN '86 REPORT (%)	87-92 AAGR FORECAST IN '87 REPORT (%)
REMOTE COMPUTING/BATCH SERV.	641	602	6%	810	791	2%	5%	5%
APPLICATION SOFTWARE								
MAINFRAME/MINI	263	263	0%	732	792	-8%	23%	24%
MICRO	535	535	0%	1545	1544	0%	24%	24%
TOTAL APPLICATION SOFTWARE	798	798	0%	2277	2336	-3%	23%	24%
TURNKEY SYSTEMS	1140	1140	0%	1823	1468	24%	10%	5%
CROSS-INDUSTRY SEGMENT TOTAL	2579	2540	2%	4910	4595	7%	14%	13%

About INPUT

INPUT provides planning information, analysis and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning, This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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Special Report

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SPECIAL REPORT

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I

Introduction

I

Introduction

INPUT monitors the Information Services industry and each year produces a forecast for that year and the five ensuing years. Thus in 1987 INPUT has developed its forecast for 1987 and projected the various submarkets it follows through 1992.

Using this forecast data base INPUT prepares reports on the status of the 4 delivery modes that make up the Information Services industry in annual reports. In addition INPUT segments the Information Services industry into markets that are Industry-Specific and those that are Cross-Industry.

The industry-specific segmentation is based on using the U.S. Department of Commerce's definition for SIC codes. The cross-industry segmentation is based on INPUT's classification. Industry-specific expenditures are based on those expenditures based on services that are characteristic or unique to the industry being monitored. For example, medical claims processing is particular to the Insurance Industry; trust accounting systems are indicative of the Banking and Finance industry.

On the other hand, cross-industry expenditures are those expenditures for services that are not specific to a particular industry. For example, human resources computer services are necessary across all industries, as are accounting, planning and analysis, etc.

A

Purpose of This Report

This report is a special one to offer some reflection and analysis on the expectation for 1988. It is especially prepared due to the interest expressed by INPUT clients about the highly unusual actions in the world stock markets on October 19, 1987 and the subsequent weeks.

In the information services industry forecast prepared in the late September/early October time frame, INPUT used the economic forecast of the Department of Commerce for GNP and inflation (i.e., GNP deflator).

These economic data coupled with INPUT's view of technology and shifts in the buying process, etc. formed the basis of the 1987 market forecast and projections.

INPUT's clients should recognize that INPUT is not an economic forecasting service and will not attempt to prove that a recession or inflation will be forthcoming.

B

Scope of the Report

This report focuses on the U.S. Information markets and analyzes user expenditures. The report is an attempt to show the relationship between economic events in the past and the user expenditure patterns that occurred as a result of those events. The primary events being reviewed are the gross national product, the product price index, the consumer price index, and the GNP deflator.

The report will not attempt to correlate stock market events with information services expenditures. Although the stock markets around the world had precipitous drops, they in themselves have little direct bearing on information services expenditures. (Note: An important exception will be the banking and finance industry segment, for obvious reasons.)

The report is organized as follows:

- Chapter II, Issues/Trends/Events, will cover the effects of the stock market drops, events taking place in the U.S. economy (after the decline), and events taking place in the world economy.
- Chapter III will cover the impacts of the economic events and discuss the possible effects of a recession (if there is one) on the industry-specific markets as well as the four delivery modes. In a similar fashion some discussion of the effects of inflation will be presented. In addition, INPUT will provide some analysis of the delivery modes vs. GNP and inflation in an attempt to show some of the long term-relationships.
- Chapter IV will present recommendations and conclusions regarding the 1987 Information Services market forecast.

C

Methodology

The INPUT information services market forecast data base is developed during the course of the year using a continuous process of interviewing those companies over $10 million per year that provide services to the Information Services markets.

In addition, stratified sampling techniques are used to develop the portion of the market forecast contributed by companies with revenues of less than $10 million.

The above methodology accounts for the original INPUT Information Services market. In addition, INPUT interviews senior management in the IS departments of Fortune 2000 companies to obtain insight into the budget for information services.

As an important factor in preparing this report, INPUT called 40 key IS executives to determine their expectations and actions for a recessionary and/or inflationary economy. The questionnaire in Appendix A was used to determine the budgetary impact of the different factors that have occurred in the economy and what plans for spending IS managers have now.

II

Issues/Trends/Events

II

Issues/Trends/Events

The dramatic plunge of the world stock markets was an unprecedented world event in modern world economics. It happened at a time in the U.S. stock market where a long-term rise of stock values had been occurring, and (to many people) there was no apparent end in sight.

In January of 1987 the Dow Jones Industrial Average (DJIA) broke through the elusive 2000 barrier and proceeded to go up to slightly over 2700 in August. On Oct. 19 the largest decline in U.S. stock market history occurred, with over 605 million shares traded and a drop of 508 points in the DJIA. The ensuing weeks have seen the DJIA oscillate between 1850 and 2000, with a brief drop below 1800 early in December.

The stock market itself is not a measurement of the business climate, and it can be debated whether it is a predictor of what is likely to occur or a sign of what has happened. The fundamental premise is that investors—be they sophisticated institutions, the man on the street, or whoever—have only one goal in mind, i.e., making money. It should be noted that in *every* transaction one of the parties is making a mistake.

To determine how Information Services markets should perform in 1988, this section will cover the issues, trends, and events that have occurred since the stock market plunge. As mentioned previously, the stock market event itself is not under consideration and no attempt will be made to determine the causes of the drop. INPUT will present information it has collected and reviewed so that readers may come to their own determinations.

Based on the worldwide stock markets decline, many economists have been forecasting a recession in the U.S. economy; still others are forecasting inflation. Finally some economists are saying the economy will in large measure perform pretty much as it had prior to the plunge. Whatever the impact of the stock market, it did do one thing: many more people focused their attention on the U.S. and world economies.

One result is that the U.S. public is now significantly in tune with the fact that the U.S. economy is inseparable from the world economy. Also it is quite apparent that the world economy is a very complex set of relationships that no one understands precisely.

The rest of this section will discuss the economic situation and mention events that have an impact on the U.S. economy in 1988, which in turn will have an impact on user expenditures for Information Services. There are four types of events that will be covered:

- Stock Market
- Political
- U.S. Economy
- World Economy

A

Stock Market

Many corporations and individuals were negatively impacted by the stock market event. On paper, company evaluations and individuals' net worth were noticeably down. However, in the interest of clarity it should be noted that the DJIA in the stock market aftermath is fairly close to where it had been some 10 months earlier. There were no reports of people jumping out of windows or doing radical things in fits of emotional stress (with the exception of the man who shot up a Merrill Lynch office in Florida, killing at least one employee (and himself)). It seems as though most people took the plunge in stride.

Some of the causes of the stock market plunge are shown in Exhibit II-1.

EXHIBIT II-1

FACTORS CAUSING THE STOCK MARKET PLUNGE - 1987

- International Trade Deficits
- U.S. Budget Deficit
- Falling Dollar
- Rising Interest Rates
- Insufficient Specialist Financing
- Insider Trading
- **Panic Selling**

Although there will be books written on the subject and presidential commissions reporting on what took place the crash itself will not be the focus of this report. After all, the stock market is a place where investors invest (or is it really a sophisticated form of betting?) based on supposed knowledge and thus cause a stock to go up (or down), thereby causing other investors to buy (or sell).

The so-called straw that broke the camel's back was the comment made by Treasury Secretary James Baker that suggested (on 10/18) the United States was willing to allow the dollar to fall. The U.S. stock and bond markets had numerous foreign investors who lose each time the dollar declines, and these investors were anxious to protect against possible losses. This is believed to be what precipitated the plummeting market.

The real impact on the Information Services industry is significantly lower stock prices. The effects of these prices are shown in Exhibit II-2 and discussed below:

EXHIBIT II-2

EFFECTS OF LOWER STOCK PRICES

- Capital Formation
- Fewer Initial Public Offerings (IPO)
- Secondary Placements
- Mergers and Acquisitions
- Possible Regulatory Changes

1. Capital Formation

INPUT believes the main effect on Information Services will be the limiting of the stock market as a vehicle to let venture capital organizations (and institutional investors) find a way to become liquid. This limitation will have an impact on the ability of new companies (in formation) to raise the necessary money to develop and prove a product or concept.

This inhibition of new companies will temper the technological improvement side and have a small negative impact on the overall growth of the

Information Services market. On the other hand, if technology is not changing, it provides existing vendors and information services providers with a larger window of opportunity to market established products and/or technology. This larger window will provide a slight positive impact on the growth of Information Services. The positive and negative growths are likely to offset each other.

2. IPO Impact

Since the stock market plunge there have been virtually no major initial public offerings, a direct result of lower prices (or higher distribution) to raise a given sum. Since companies are evaluated against those of like kind that are already public, the IPO market has been curtailed. This in itself is only a problem for companies that were absolutely in need of the additional capital to stay in business. Companies that have strong balance sheets are in a position to raise additional money from their banks or existing venture firms.

Raising money from these sources has a subtle benefit to the company and its existing shareholders in that the companies will probably only raise the amount they truly need as opposed to getting extra funds from the more generous public. Secondary effects will postpone the potential employee morale builder (especially if the stock market was continuing to edge up), the income from cash investments, and the possibility of becoming over-extended in programs because of a large cash influx.

3. Secondary Placements

And as mentioned previously, if the company cannot raise capital in the open market, its investors will have to come up with additional money and not be in a position to fund other investments. Furthermore, some long-range technology or business development programs rely on going to the market for secondary placements or other instruments to fuel capital-intensive expenditures. This is the case with starting up new hardware lines or major software developments.

In the professional services sector the newer area of Systems Integration may require the long-term serious players to consider alternative financing methods that could have included the stock market.

4. Mergers and Acquisitions

Although there has not been a significant upturn in the number of mergers and/or acquisitions, INPUT believes there will be. The mergers and acquisition rate in the information Services industry had been increasing in 1987 as measured by the Broadview Index. There was a sort of "fever" regarding alliances, mergers, and acquisitions. This seems to have slowed down (there has been no actual statistic published at this writing).

However, INPUT, through its sources, believes that an increase in mergers and acquisitions will occur as the feeling spreads that the stock market and world economy have gotten into a steady-state again.

INPUT is forecasting a noticeable increase in foreign firms purchasing U.S. properties, and is quite surprised that very few have been announced. Besides the steady-state phenomenon, other plausible explanations are the complexities of international legal factors, cultural differences, and time zone differences. All slow the process.

5. Possible Regulatory Changes

Regulatory changes are being suggested as a means to prevent future chaos. Thoughts being considered are limits on how much a stock can rise or fall, limits on "portfolio insurance" and other ways to prevent economic catastrophe from a disorderly market.

6. Summary

The lower stock prices have given rise to an unprecedented number of companies announcing company stock repurchase plans. IBM has scheduled one billion dollars to repurchase its shares. Repurchase plans, have 3 major effects: 1) they provide a sense of confidence to other investors that the company believes its stock is very attractive in light of all other possible investments; 2) they have the effect of improving the earnings per share (fewer shares outstanding), which tends to be a major factor in evaluating the market value of the company and; 3) they provide additional shares for employee stock options and/or shares for future acquisitions.

Corporate insider trading is definitely on the buy side. During the first 30 days since October 19, corporate buyers have been outnumbering sellers by 7 to 1. This is opposed to the general trend of corporate insiders selling at a margin of 2 1/2 to 1. This strong insider buying, when added to the fact that historically insiders have never been wrong (when on the buy side), provides a strong hint that the stock market plunge was an anomaly. Certainly the insiders seem to believe their companies became extremely undervalued. Insiders are not typically traders due in large measure to the following factors: the scrutiny of the SEC, holding periods, and possible insider trading infractions.

B

Political Scene

In 1988 the U.S. Presidential elections will be held. If there is one thing everyone can agree on, it is that the U.S. economy is now in considerably better shape than during President Carter's administration, which ended in 1980. Then we had very high unemployment, very high interest rates, high inflation (for the U.S.), an unbalanced budget, and much social welfare spending.

Eight years later the economy has improved significantly and inflation, interest rates, and unemployment are all down, but with very large budget deficits and many social programs seemingly curtailed at the expense of defense budget increases.

INPUT does not desire to get into a political discussion on the impact of the political scene on Information Sciences. However, it seems perfectly reasonable to conclude that the Republicans are not anxious to turn over the government to the Democrats. This means the Republicans will do all they can to keep the economy going in a positive fashion. While the intent will be there, it will be difficult to do since the U.S. Congress is controlled by the Democrats.

The Democrats have nothing to gain by adversely impacting the economy on a short-term basis, so they will within partisan limits help the economy where they can. Or at least they cannot overtly sabotage efforts to keep the economy moving forward.

The Federal Reserve will do its utmost to keep interest rates as low as possible; the U.S. Treasury will advocate the falling of the dollar to reach more realistic levels that will promote worldwide trading and increase U.S. exports.

C

U.S. Economy

The behavior of the U.S. Economy in the next few months will have a distinct bearing on how companies perceive and react to their business climate, which in turn will have a major impact on Information Services expenditures.

Most economists and analysts forecasting a slowdown or recession are basing it on the belief that the consumer will not spend, due to a loss of confidence in the economy, a loss of wealth in the market, or a fear that the U.S. is heading toward a period of major economic chaos. Since the consumer spending and retail spending patterns account for roughly 2/3 of the GNP, the forecasts and prognostications being suggested had ominous tones. The situation was of special concern because the stock market meltdown occurred just prior to the annual Christmas holiday shopping season.

Christmas is the time of year where merchants make 1/3 of their revenue and 1/2 of their profits, and is a key factor in the success of the merchant for the year. If consumer spending slowed, there could be serious ramifications that would have a domino effect throughout the economy.

Thsi report will look at events that have taken place in the U.S. economy and review three main areas:

- Retail Sales Reports.
- Indicators Released.
- Observations and Mood Comments.

1. Retail Sales

As mentioned above, retail sales are a key factor in what will happen in the economy in 1988. Exhibit II-3 shows a sample of headlines that portray what is happening on almost a real-time basis. On some occasions the same statistical reports will be used by two different sources to provide totally divergent views. Some analysts scrutinize the statistics to draw a conclusion they are already seeking. (Note: There is no attempt by INPUT to do this.)

EXHIBIT II-3

SAMPLE HEADLINES

- San Jose Mercury News 11/6/87
  - Consumer Credit Undaunted by Collapse
- San Francisco Chronicle 12/1/87
  - Bay Retailers Surprised by Strong Sales
- San Francisco Chronicle 12/4/87
  - Retailers' Sales Disappointing
- San Jose Mercury News 12/9/87
  - Recession Fears Ease as Economy Rides out Crash
- San Francisco Chronicle 12/10/87
  - Christmas Sales Are Picking Up
- San Jose Mercury News 12/12/87
  - Shoppers Haven't Cut Back —Americans Step up Buying of Retail Goods
- San Francisco Chronicle 12/12/87
  - Retail Sales Increase 0.2 Percent —Wholesale Prices Steady

Without going into specifics, the only dragging elements in retail spending are luxury and/or discretionary items such as furs, diamonds, and expensive cars.

Exhibit II-4 shows news articles that appeared the same day in two different newspapers that ostensibly reported the same event—that is, the Commerce Departments reporting an increase of 0.2 percentage points for spending in November (over the previous month). The reader needs to decide which presentation is correct. It is likely that all the information is somewhat true.

EXHIBIT II-4

TWO DIFFERENT VIEWS OF THE SAME EVENT

12/12/87

San Jose Mercury News

- Written by Robert A. Rankin
  Mercury News Bureau
- Dateline—Washington
- Lead-In
  - "Born to shop" may indeed be the credo. Forget those widespread fears that the October 19 stock market crash might scare consumers into cutting spending enough to trigger a recession.
- Other Quotes
  - Sears Roebuck very pleased. Sales were stronger than expected. Forecast is revised upward.
  - Carter, Hawley, Hale said sales are beating our expectations.
  - Department store sales are up 6 percent over last November (1986).

San Francisco Chronicle

- Written by New York Times
- Dateline—Washington
- Lead-In
  - Evidence mounted yesterday that consumers have slowed their spending in recent months, but the cutback does not appear severe enough to shove the economy into early recession.
- Other Quotes
  - Retail sales were dragged down by the sluggish automobile sector, which was down 0.5 percent. (Note that without the auto sector, total sales would have been up by .4 percent.)

INPUT has also made an informal survey of individuals in the past few weeks and found that no one curtailed their holiday-season spending last year. In addition, local contacts in the retail industry have said that the holiday season had acceptable growth (of course, it could have been better!). (Note: The San Francisco Bay Area is acknowledged by all to be one that is enjoying prosperity above the national average.)

Furthermore, in INPUT's survey of IS managers, none indicated that his/her enterprise had seen any actual signs of a slowdown or decline in indicators they use to track their businesses.

INPUT's conclusion is that retail sales have not slowed to an extent that would warrant belief in an eminent slowdown or recession in 1988. The retail end of the economy has held up.

There is a plausible explanation: the average stock market investor was not highly leveraged nor had the majority of his/her investment in the stock market or related instruments. The enjoyment of the holiday season is not tied to one's net worth or wealth but to more fundamental values revolving around caring about people and being in touch with spiritual feelings.

And finally, almost any investment made more than a year ago is still ahead, *and* one's net worth or wealth in December of 1987 is essentially what it was in December of 1986.

The bottom line is that retail sales are holding up because the average American has much to be happy about and was not seriously affected by the stock market game.

2. Indicators Released

Since the stock market meltdown there have been numerous government indicators that cast doubt on a possible slowdown or recession. Exhibit II-5 summarizes the major announcements. Most of these announcements are upbeat and not indicative of an economy that is turning down.

In fact, with unemployment decreasing and factory utilization going up, there actually are renewed possibilities of a spurt in inflation.

3. Observations and Mood Comments

INPUT has also noticed business press articles that provide a sampling of the opinions of business people in the general economy.

For example, a survey of 80 chief executives in November indicated that 78% expect to get through 1988 without a recession. Back in August a slightly larger sample yielded 84% who saw no recession, and 53% of the new sample expect profits to rise by more than 10% in 1988. The business community does not seem to agree with the economists/analysts' view of the "crisis".

One should also recall that corporate insiders are buying their company stock at unprecedented ratios to selling.

EXHIBIT II-5

MAJOR INDICATORS

- Manufacturing Capacity Utilization at 81.4 Percent
- Unemployment at Lowest Level in 10 Years
- Personal Income Surge Highest Since WW II
- Machine-Tool Orders Increased 46 Percent in October over September, Which Was up 1.8 Percent
- Factory Orders Increased by 1.1 Percent in October over September, Which Was up 1.8 Percent
- Economic Indicators Declined Only .2 Percent in October, Mostly Due to the Decline in the Stock Market*

*If the Stock Market Stayed the Same, the Economic Indicators Would Have Been up .9 Percent

Ad spending is forecasted to rise 9% in 1988 despite the stock market crash. Since advertising expenditures are somewhat discretionary, the fact that they are forecast to increase is a positive sign.

A final mood sensor is a recent survey of purchasing managers indicating that there still is an expanding influence in the economy. On November 30, a survey of 250 industrial purchasing managers released their composite index (sponsored by the National Association of Purchasing Management), which indicated that production and new orders increased in November for the 11th consecutive month.

In summary, the mood and sense of most corporations has been one of having a cautious positive nature. Some have thought of contingency plans on how to deal with a change in the economy. This is prudent management behavior. Of the IS managers INPUT polled, fewer than 15% had been asked to prepare a contingency plan based on recent economic events. Most (90%) expressed caution as the operative word and all believed they could respond to changes in the market very quickly.

D

World Economy

There is no doubt that the U.S. is a significant participant in the world economy. The U.S. imports oil, cars, and steel—all making a large contribution to the trade deficit. The dollar has been the key reconciler of trade for governments and had been very strong until mid-October.

The belief then was that a lower dollar would increase U.S. exports, bringing the trade deficit more in line and altering the balance of payments. The U.S. is now the largest debtor nation in the world.

Following the stock markets' worldwide decline (remember foreign investors lose when the dollar declines) the dollar has fallen against the Yen, the Mark, and the Pound, and had seemingly stabilized in some instances at the lowest point since World War II.

The European Community helped out by lowering their interest rates to bolster their own economies and thereby spur economic growth internally. These efforts are also an attempt to support the dollar. There is cooperation in the world economy to restore faith and confidence in the dollar and to get the international economy back on track.

The record $17.6 billion U.S. trade deficit in November was a real shock, as many believed a reversal of the trade deficit was likely. The deficit is actually another sign that the U.S. economy is very strong; even with a significantly lower dollar. The U.S. is still importing at an increasing rate. Based on this announcement in mid-December, the dollar traded as low as 128.95 Yen and 1.631 against the Mark. The U.S. is working with other trading partners—such as Taiwan, South Korea, Hong Kong, and Singapore—to obtain an increase of 15 to 20 percent in their currencies relative to the U.S. dollar. This increase is proceeding very slowly.

Exhibit II-6 shows some of the major events occurring in the world economy that will have a bearing on how the U.S. economy is likely to behave in the forthcoming months. INPUT believes that the governments of most countries will cooperate in putting the world economic situation in order.

Another sign of cooperation is from the OPEC meetings of mid-December, where an oil price of $18 per barrel seems likely, with no increase of legal production. This stable price is against Iran's vehement wishes and may have difficulty holding up as an agreement. However, the intent of the middle-east countries (sans Iran) seems to be one of cooperating with the world economy. After the agreement, the oil price in the secondary market dropped toward $15/barrel as a sign of lack of confidence in the "new" accord. This drop will take the pressure off possible inflation.

EXHIBIT II-6

WORLD ECONOMIC EVENTS

- San Francisco Chronicle 11/25/87
  - European Banks Cut Key Rates
    - Effort to Stabilize Dollar, Spur Growth
- San Jose Mercury News 11/30/87
  - West Germans Develop Plan to Ease Credit
- San Francisco Chronicle 12/1/87
  - Oil Prices Fall in Moderate Trading
- San Francisco Chronicle 12/8/87
  - U.S., Canada Get New Trade Pact
- San Jose Mercury News 12/11/87
  - $17.6 Billion Trade Gap Stuns Analysts

In summary, the negotiations and interactions in the world economy are not over (at this writing), but the correct changes seem to be occurring to put order and stability in the world economy (not withstanding the surprise trade deficit record in November).

III

Information Services Industry Impact

III

Information Services Industry Impact

The Information Services Industry is impacted by the economy as one would expect. Information Services budgets tend to be a percentage of the revenues of a particular industry segment and in many ways are proportional to the amount of computer resources required to deliver products, develop products, or support products.

Information Services expenditures are therefore impacted by the general revenue trends of the enterprises they are supporting. Exceptions would be instances where an investment is required to provide a new manner of doing business or a more effective way of running the business based on productivity improvements.

Much of the typical IS budget is relatively fixed on supporting hardware, personnel, and associated overheads; these three dictate the increase in the budget for each year. Budget increases tend to track acceptable wage increases, etc. and lately have been in the 4-6% range, barring unusual project requirements.

A

Market Overview

INPUT has analyzed the growth rates for the four delivery modes since 1977 (turnkey systems were not accounted for until 1982). These growth rates were then normalized for "real" growth by subtracting the GNP Price Deflator. The result was then plotted against real GNP to see the relationship of real growth of the delivery modes versus "real growth" GNP.

Exhibit III-1 is a table that was developed from previous INPUT research in the years 1978 through the present. The table shows the percent growth by delivery mode. Turnkey systems were not monitored prior to 1982.

Exhibit III-2 is a table of the U.S. Gross National Product and other indices such as the Producer's Price Index (PPI), Consumer's Price Index

(CPI), the GNP Price Deflator, and calculated "real growth" (GNP minus GNP Price Deflator). The GNP Price Deflator is a measure of what is commonly called inflation.

Exhibit III-3 is a table that shows the "real growth" of each delivery mode for the years 1977 through 1986. There are two sets of values for each delivery mode for each year. The values in Column A are the percent growth for the delivery mode less the GNP price deflator for the same year. Those in column B are the percent growth for the delivery mode less the GNP price deflator for the previous year.

Exhibit III-4 is a plot of each delivery mode using both values for each year. Using both values produces a band of real growth. Also plotted in the Exhibits are the total market and the real-growth GNP. The intention was to determine any obvious relationships. The plots tend to show little correlation to the real-growth GNP. The processing/network services plot comes closest to following the GNP plot, except in the last 2 years

EXHIBIT III-1

PERCENT MARKET GROWTH BY DELIVERY MODES 1978-1986

Year	Processing/ Network Services	Software Products	Professional Services	Turnkey Systems	Total Market
1978	18.7	26.7	20.0	–	–
1979	20.1	28.7	26.0	–	–
1980	16.7	31.0	27.4	–	–
1981	16.2	32.4	26.9	–	–
1982	10.2	37.1	16.8	23.1	18.5
1983	12.9	35.1	21.4	27.9	21.7
1984	16.1	33.3	20.2	30.0	23.2
1985	10.1	18.9	19.8	11.4	14.7
1986	14.2	23.1	15.8	10.9	16.4

Source: INPUT Research and Reports 1978-1987

EXHIBIT III-2

U.S. GNP AND OTHER INDICES
(Percent Change)

Year	GNP (Current $)	PPI Finished Goods	CPI All Items	GNP Price Deflation	"Real-Growth" GNP-Price Deflation
1976	11.5	4.4	5.8	6.4	5.1
1977	11.7	6.5	6.5	6.7	4.0
1978	13.0	7.8	7.7	7.3	5.7
1979	11.5	11.1	11.3	8.9	2.6
1980	8.9	13.5	13.5	9.0	-0.1
1981	11.7	9.2	10.4	9.7	2.0
1982	3.7	4.0	6.1	6.4	-2.7
1983	7.6	1.6	3.2	3.9	3.7
1984	10.5	2.1	4.3	3.8	6.7
1985	6.2	0.9	3.6	3.3	2.9
1986	5.2	-1.4	1.9	2.6	2.6
1987	6.1 *	2-3 ***	3.6 *	3.3 *	2.8 *
1988	7.5 **	–	4.4 **	4.1 **	3.4 **

* Estimate - Department of Commerce
** Estimate - Council of Economic Advisors 8/87
*** Estimate - Bureau of Labor Statictics

Source: U.S. Department of Commerce

EXHIBIT III-3

REAL GROWTH BY DELIVERY MODE 1977-1986
(Percent)

Year	Real-Growth GNP	Processing/ Network Services		Software Products		Professional Services		Turnkey Systems		Total Market	
		Growth - Current Year's Deflator	Growth - Previous Year's Deflator								
		A	B	A	B	A	B	A	B	A	B
1977	4.0	–	–	–	–	–	–	–	–	–	–
1978	5.7	11.4	12.0	19.4	20.0	12.7	13.3	–	–	–	–
1979	2.6	11.2	12.8	19.8	21.4	17.1	18.7	–	–	–	–
1980	-0.1	7.7	7.8	22.0	22.1	18.4	18.5	–	–	–	–
1981	2.0	6.5	7.2	22.7	23.4	17.2	17.9	–	–	–	–
1982	-2.7	3.8	0.5	30.7	27.4	10.4	9.7	16.7	13.4	12.1	8.8
1983	3.7	9.0	6.5	31.2	28.7	17.5	15.0	24.0	21.5	17.8	15.3
1984	6.7	12.3	12.2	29.5	29.4	16.4	16.3	26.2	26.1	19.4	19.3
1985	2.9	6.8	6.3	15.6	15.1	16.5	16.0	8.1	7.6	11.4	10.9
1986	2.6	11.6	10.9	20.5	19.8	13.2	12.5	8.3	7.6	13.8	13.1

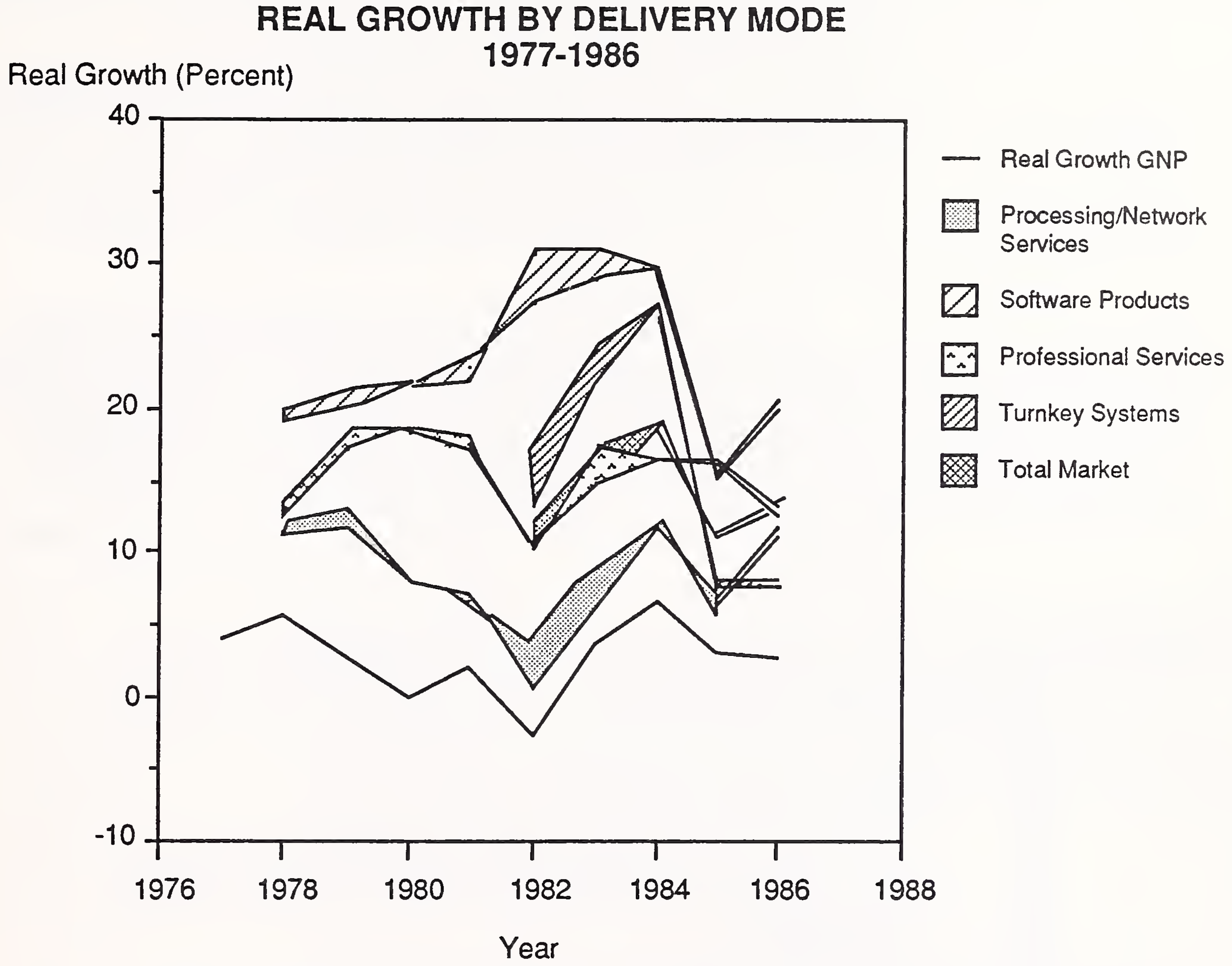
For each delivery mode

Column A is the percent growth minus that year's GNP Price Deflator
Column B is the percent growth minus the previous year's GNP Price Deflator

when the GNP was essentially flat and the Processing/Network curve edged up. Also in the '80 to '81 time frame the GNP increased and the Processing/Network curve went down. The other delivery modes seem to show even less correlation.

The total information services market tracked the "real growth" GNP fairly closely from 1982 through 1985. In 1986 when the GNP dropped slightly, the total market real growth went up, based on software products and processing services growth. Professional services companies' real percentage growth declined at a faster rate than the real-growth GNP.

EXHIBIT III-4



Note: Values for 1980 represent the growth from 1979 to 1980; 1984 represents growth from 83 to 84, etc.

B

Possible Slow-down?—Course of Action

1. Survey Comments

The IS managers interviewed as part of this special report were all senior members of their organizations. The organizations selected were all Fortune 500 companies. The questionnaire in Appendix A was used to initiate the discussions that took place.

The consensus (90%) was that the stock market declines would have no impact on respondents' immediate plans nor any impact on their 1988 budgets. As astute business people, they were aware that a change in the economy would likely occur (someday) and as responsible business managers they tended to monitor those business indicators that impacted their companies' businesses.

No one in the sample felt that any indicators had changed to warrant any sort of action. They all indicated that their IS departments had a "business as usual" approach except for very minor exceptions.

All had thought about possible contingencies as a result of the changes that could happen in the economy, but fewer than 10% were consciously trying to slow down certain expenditures. Slowing down was used in the context of shuffling projects in the budget to minimize the impact on the IS organization, and to provide an opportunity for better reaction to possible economic changes.

Since the concern about the economy occurred fairly late in the year, most interviewed were far along in the usual budget process. All of those interviewed indicated that budgets would not be altered because of the possible economic changes, and all expected approval shortly for the coming year. The average budget increase was in the 5-7% range.

Exhibit III-5 provides some of the comments that were made by those interviewed.

EXHIBIT III-5

I.S. MANAGER COMMENTS ON ECONOMIC CHANGE

- Service Industry Participant:
  - (Constantly monitoring economic indicators) "Saw early signs of recession in late 1988, early 1989 and planning for it"... "just watching to see if stock market acts as catalyst."
- Process Manufacturing Participant:
  - "Recession is already built into the plan." Re: inflation "don't see it coming."
- Process Manufacturing Participant
  - "My business line is pharmaceuticals, which is terribly immune to recession," "regulatory considerations are the main budgetary impact."
- Several Oil Companies:
  - Main concern is price of oil.
- Discrete Manufacturer:
  - "Recession is bound to come...not sure stock market crash will accelerate it." "Do not forsee inflation."

2. Delivery Mode Analysis

Earlier in this section a chart showed the possible impact of GNP as related to the delivery modes. This section will discuss the impact INPUT would expect if the GNP were to decline. Note: This section should be viewed as a "what-if" scenario, as INPUT does not believe a slowdown or recession is imminent.

a. Processing/Network Services

i. Remote Computing/Batch Processing

Most of the services in this delivery mode are related to the number of transactions the user requires. These transactions are charged at a price-per-transaction or hourly rate. If there is a slowdown, there is the likelihood that the number of transactions will decline, thereby lowering the expenditures for VAN usage, on-line data bases, and most remote services.

Expenditures that are deemed less essential will be either postponed or cancelled. Two applications that are likely to show increases are credit card processing and electronic funds transfer. INPUT believes people will use their credit cards more (paying off the bill in the allotted interest-free timeframe) to limit the cash they carry. People out of work (a slowdown or recession is likely to raise unemployment) will also use credit for essentials to tide them over.

ii. Facilities Management

INPUT believes there will be more interest in using outside services to replace large IS requirements. This replacement would not occur in a slowdown scenario, but would occur more frequently as the severity of a recession increases.

iii. VANs

VAN use would decline somewhat based on the decrease of transactions. However, in a slowdown IS departments would likely postpone hardware procurements and those intending to create private networks using TI switches would likely shift the private network traffic back to VANs, thus postponing the capital expenditure.

iv. Utility Processing

Utility Processing as an outside expenditure would be curtailed to the extent that it could be done in-house on existing equipment. Thus utility-processing expenditures would decline.

v. On-line Data Base

On-line data base usage in many instances is viewed as somewhat discretionary. Certain data bases such as stock quotation systems, news files, bibliographies, and numerous others would see a noticeable decline in use. Others—such as credit and property-oriented or transfer-oriented data bases—would probably increase as individuals refinance or trade property.

b. Software Products

In general the effects of a slowdown or recession on software products would depend on the specific circumstances. Overall, software products is the delivery mode that would decline the most because this expenditure is the most discretionary. Certainly if hardware is postponed or consolidated the pull-through on software will be noticeable. The two main categories of software products—systems software and applications software—are presented below; each has particular characteristics to be considered in a slowdown or recession.

i. Systems Software

Systems software itself comprises three segments. Systems control software is very heavily tied to the number of hardware platforms. Operating systems software expenditures would decline based on the hardware postponed by the IS manager. On the other hand, network control software would stay flat or rise based on the desire of IS management to get more benefit out of existing hardware. This increase in benefits could be accomplished by connecting previously disparate hardware systems in a network.

- Data Center Management Tools Software expenditures would remain flat (which in effect is growing in the stated slowdown scenario) as users spend incremental dollars to get more performance or productivity out of existing hardware.

- Application Development Tools spending would increase for tools oriented toward the actual users, such as the current wave of relational DBMS vendors. Software products oriented toward corporate programming departments would most likely decline in spite of the expected performance benefits. This decline is due to the personnel training and head count retention issue versus large outside expenditures.

ii. Applications Software

Much of the industry-specific software purchases would be postponed as a means to curtail spending. This could be the area of Information Services that would be most heavily impacted by a slowdown scenario. The people necessary to implement specialized application packages would be under pressure to maintain existing systems, if these people are still on board.

c. Professional Services

The professional services delivery mode has segments that will decline and some that will remain flat in growth. Note: It should be intuitively obvious that being flat in a slowdown or recession economy is much like above-average growth in an expanding economy.

i. Education and Training

On one hand a very small number of persons would be trained and given further education to permit them to do more for the organization. This training would be a small addition to the upside and would be offset by the general decline in education and training as discretionary expenses. In a slowdown it would be easy to curtail expenditures for education and training.

ii. Software Development

Software development being performed by an outside professional services firm is generally viewed as essential for software that cannot be developed internally. In a slowdown it is likely that such software development would be continued if the project was reasonably far along. If the project was just being initiated, it is likely these outside expenditures would be postponed. Of course programs considered integral to the long-term success of the corporation would be funded, but perhaps at a slower rate. After all, the result is not needed as quickly because of the slowdown. The one positive note is that slowdowns (or recessions) do not last forever.

iii. Consulting

The use of consultants will likely decrease as enterprises will be closely scrutinizing their outside expenditures. If the IS budget shrinks, there would have to be some very compelling reasons to use consultants. INPUT forecasts that outside consultants would be negatively impacted at a higher rate than other segments in the professional services sector.

iv. Facilities Management

Just as in processing facilities management, organizations will take a hard look at how an outside firm could help them run their computer centers and facilities. If the enterprise needs to pare its head count, it may find it economically attractive to use outside services. INPUT believes there will be considerable investigation but minimal additional business in this segment. It's not clear why an enterprise would want to retain its hardware and have outside people running the equipment when it could pass the entire situation over to a processing facilities management relationship.

v. Systems Integration

Major companies have implemented the first round of broad-based application systems such as general ledger, human resources, basic manufacturing systems, etc. These companies are now desirous of implementing mission-critical applications that require the experience and unique skills that professional services companies have cultivated. Commercial enterprises are letting multimillion-dollar, multiyear contracts to put entire systems together (hardware, software, and communications) to obtain competitive advantage and more efficiency in the IS organization.

INPUT believes these programs are typically viewed as integral to the future success of the enterprise. This being the case, the programs will continue.

d. Turnkey Systems

Turnkey systems will be the delivery mode most impacted by a slowdown. VARs selling to small businesses will find the small business anxious to conserve cash and willing to postpone expenditures until better economic times occur. Turnkey systems sold to firms looking to provide tools for their engineering and design groups will likely curtail their expenditures as they look at ways to cut costs.

Since turnkey systems have been very successful in several major application areas—such as CAD/CAM/CAE, automotive markets, and medical/health care systems—it is likely that a downturn in the economy will negatively impact these markets; medical systems will be less affected than the others, due to continuing strong cost-control pressures.

e. Summary

Although the above comments are based on a slowdown scenario, it should be reiterated that INPUT is not forecasting such an event nor is it changing its forecast for 1988. One overall important factor to consider is that the IS budget is generally from .7 percent to as high as 4% of an enterprise's revenue level. Thus even if an enterprise was to cut out the entire IS organization there would not be dramatic savings. Furthermore, the capital expenditures required by IS are generally related to IS' place in the organization; cutting IS capital expenditures is not the first action senior management would take to control costs. In fact, some recent survey work by Paine Webber suggests that capital expenditures sponsored by the IS department have been somewhat below the overall trend over the past few years, and that there are inherent needs that have been accumulating.

This backlog of needs bodes well for the Information Services industry. It should also be noted that surveys of IS managers, computer retail stores, and purchasing managers have shown that corporate personal computer purchasing has not gone down as forecasted by the business economists and analysts.

3. Industry Sector Analysis

Based on the INPUT survey made after the world stock market decline, there are no data to suggest any industry-specific reactions (except perhaps for the stock brokerage business, which is part of Banking and Finance).

The scenario of a slowdown that could lead to a recession is primarily based on economists' belief that the average American will reduce his/her spending. Since consumer goods purchases stimulate two-thirds of the Gross National Product, any slowing or changed consumer patterns would have a domino effect on other industries.

IS expenditures are tied to the general needs of the enterprise, and generally measured as a percentage of the company's gross revenues. A slowdown in revenue production would necessarily have a negative impact on IS expenditures. This in turn would have an impact on the Information Services market.

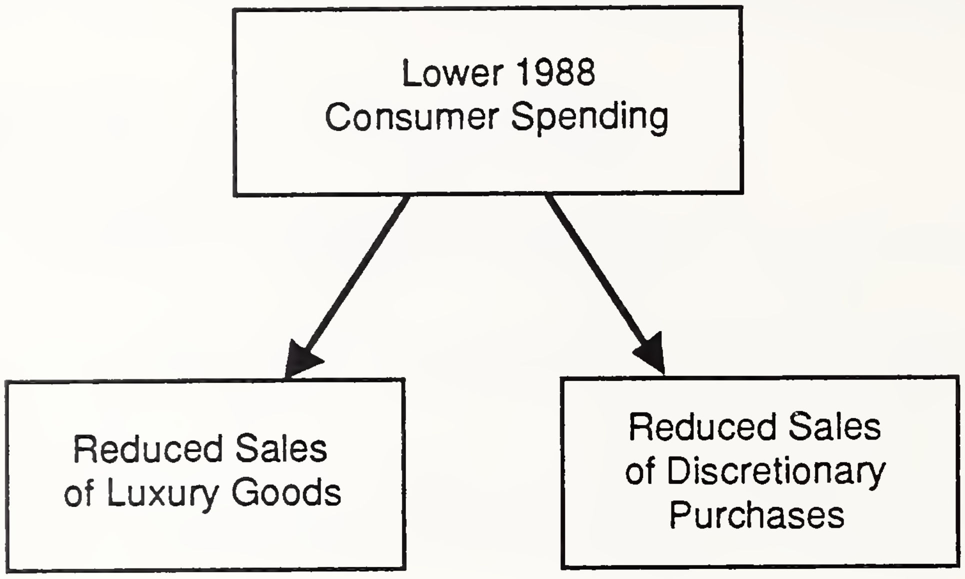
INPUT believes that the average consumer, while aware of the stock market, was not negatively impacted by the sudden drop in the market. In fact, the market dropped to where it had been 10 months earlier, thereby erasing large paper gains. On the other hand, there were a small number of highly leveraged trading professionals who took it on the chin. The average consumer does not identify with these individuals.

In the sections below, the industries most likely to be impacted by consumer spending slowdowns are identified. No doubt industries that are impacted will look for ways to trim expenditures, and these reductions would affect the IS part of the enterprise. As mentioned previously, IS generally does not account for a major portion of capital expenditures, so that aspect of the IS budget might not be impacted directly.

Exhibit III-6 shows the general pattern that would occur *if there was a slowdown* . The Exhibit shows that the slowdown in consumer spending will highly affect the luxury goods part of the retail economy and mildly affect discretionary expenditures.

EXHIBIT III-6

SLOWDOWN: SPENDING PATTERNS



Lower 1988 Consumer Spending

Reduced Sales of Luxury Goods

- Boats
- High-end Cars
- Condos
- Designer Clothing

Reduced Sales of Discretionary Purchases

- Travel
- Vacations
- Nondurable Goods

EXHIBIT III-7

CONSUMER SPENDING SLOWDOWN INDUSTRY SECTOR IMPACT

Unaffected

- Utilities
- Telecommunications
- Insurance
- Medical

Impacted

- Discrete Manufacturing
- Process Manufacturing
- Transportation
- Distribution
  - Retail
  - Wholesale
- Banking and Finance
- Education Services
- Federal Government
- State and Local Government
- "Other"

Luxury goods are such items as boats, high-end automobiles, condominiums, designer clothing, jet-set vacations, etc. Discretionary expenditures are weekend trips, vacations, nondurable goods, dining out, etc.

Below is an industry analysis of the lower spending pattern or slowdown scenario. Beside the lower spending for services, INPUT will consider the other economic factors that are changing, such as lower dollar and lower oil prices, as well as the possibility of inflation. Exhibit III-7 indicates the industry-specific impact.

a. Discrete Manufacturing

This industry sector will feel the effects of a slowdown in terms of fewer products and services being required as U.S. consumers cut back. On the other hand, the decline of the dollar should put pressure on exports as U.S. products and services become more competitive in foreign markets. Furthermore, U.S. manufacturing has been positioning itself to be more competitive in foreign markets by becoming more cost-conscious and by improving manufacturing costs. Data from the Bureau of Labor Statistics shows that U.S. manufacturing productivity and labor cost control have been putting on their strongest performance since World War II. Only Japan has performed better. Exhibit III-8 shows U.S. manufacturing productivity and labor costs in the period 1982 through 1987. It should be noted that Europe's labor costs have risen (in local currencies) an average of 2 to 3 percent a year, whereas U.S. costs have been falling steadily. Factoring in the 40-percent plunge in the U.S. dollar from 1985 through November 1987 gives the U.S. the lowest manufacturing labor costs (in dollar terms) in the developed world. (Note that since November the dollar has skidded more, thus reinforcing the above analysis.)

Since manufacturing capacity has been hitting recent highs, there actually are fears that increased demand and the other recent trend of employment improvements will cause an inflationary spiral.

b. Process Manufacturing

The portion of process manufacturing that supplies durable goods is unlikely to notice any impact from a slowdown. People will not give up eating or the other daily consumable items because of the slightly impacted economy scenario. However, the recent drop in oil prices will have a dramatic impact on the fortunes of the oil industry and a decided impact on IS revenue expenditures. The recent discord at the OPEC meeting has resulted in a drop in oil prices again (they had improved and actually risen over $20/barrel) and a possible floor of $15/barrel. Some segments of the U.S. economy will benefit from declining oil prices—so the decline is a two-edged sword. Exhibit III-9 shows the winners and losers of oil price declines. In fact, although lower oil prices are bad news for the oil and gas industries, lower oil prices have been viewed by

EXHIBIT III-8

MANUFACTURING COMPETITIVENESS 1982-1987 AVERAGE ANNUAL GROWTH RATE (Percent)

Country	Manufacturing Output per Hour	Total Manufactuing Output	Unit Labor Costs in Nation's Currency	Current Unit Labor Costs as Percent of U.S. Costs*
United States	4.8	6.2	-1.5	100
Germany	2.9	2.0	1.2	212
France	2.4	0.5	4.0	132
Canada	3.0	5.1	2.1	119
Great Britain	4.7	2.9	2.5	200
Japan	5.1	6.7	-1.9	153

* Calculated in dollars, with an index of United States = 100

Source: Data through 1986 from Bureau of Labor Statistics; 1987 data from Economist and Financial Time

EXHIBIT III-9

OIL PRICE DECLINE WINNERS AND LOSERS

Winners	Losers
• Transportation	• Banks (Energy Loans)
• Agriculture	• Oil and Gas
• Discrete Manufacturers	
• Process Manufacturers	
• (Non-Oil or Gas)	
• Construction	
• All Oil Consumers	

many economists to be the antidote to the possible consumer spending shortfall, and as a means to temper the inflationary potential.

c. Transportation

The transportation industry is dependent on consumer spending patterns. Less demand for goods translates into less manufacturing and thereby fewer trucking and distribution services. Less discretionary spending for vacations means less revenue for airlines. And if consumer spending slows down, there will be a noticeable decline in business travel as business will quickly realize that travel and living expenses are easily reduced.

So while lower oil prices will lower operational costs, there will be less revenue but higher operating profits.

d. Utilities

Most people will not curtail their use of utilities as a result of a slowdown scenario. Creature comforts have become an important part of the U.S. psyche, and the YUPPIE and DINK (Double Income, No Kids) mentalities would not seriously consider modification of these services.

e. Telecommunications

INPUT believes a slowdown in consumer spending would not appreciably affect the telecommunications sector. Individuals are “reaching out” to stay in touch with friends and family, and this impulse is likely to increase rather than diminish in a downturn economy.

If business softens, individuals will stay more in touch and be more caring and supportive to those negatively effected. This increase in concern will counter balance those who see personal telecommunication expenses as discretionary and try to limit these expenses.

On the business side of the economy, downsizing will result in fewer business expenditures for telecommunications. Less demand means less voice and data traffic; leased facilities might be cancelled. Business will clamp down on personal conversations and social talk. This could be a catalyst to an increase in voice mail applications. Measurement systems for control of personal telephone time and expenses would become more popular.

f. Distribution

Retail and wholesale distribution companies will feel the immediate brunt of any consumer slowdown. They will react quickly to changes in the consumer’s spending patterns and start the whole domino effect in motion, cancelling orders, being more cautious on new products, and putting the brakes on the consumer-retail-manufacturing chain. The durable part of the distribution chain will have little impact. The nondurable goods sector is where the higher-priced items tend to be situated, so a slowdown in these items is felt even more.

The impact of a lower dollar or lower oil prices has a minor effect on the retail and wholesale distribution sectors.

g. Banking & Finance

This is the largest sector of the U.S. economy in terms of IS expenditures and is impacted by consumer slowdowns in several ways.

In banking, if the consumer decreases spending because of lack of confidence, then instantaneously there will be an increase in savings. This increase will provide banks and financial institutions with a source of more funds. On the other hand, lower oil prices put a drag on the bank's loan portfolio; the ability to make more money by having more to work with is tempered by the potential loss of energy-related loans.

In the financial sector there has been some consolidation, ranging from brokerage houses buying specialists that were having trouble meeting their capital requirements, to the billion-dollar merger of Shearson with E.F. Hutton. Many large financial and investment banking institutions lost millions of dollars in the October 19 market quake. The loss of stock values has had a decided impact on capital formation activities and most brokerage houses have reacted quickly to paring these operations.

Although the stock market volumes have remained about 150-250 million shares per day, the Street makes its money on capital and financing activities, which have in large measure been postponed.

INPUT is surprised that cash-rich companies that had been investigating the Information Services industry have not moved quickly to absorb devalued, vulnerable companies. Foreign investors could be having a field day picking off prime U.S. properties because of foreign currencies being worth so much more.

INPUT believes that by early next year there will be significant purchases by foreign companies of U.S. information service companies, or cash-rich U.S. companies looking for opportunities to grow further in Information Services. It should be noted that many large U.S. cash-rich companies have announced stock buyback plans, suggesting their corporate stock is undervalued today.

These forecasted activities will bolster the corporate financing sector and the recent dismissals of the professionals in this Wall Street area may be more of a "knee-jerk" reaction than it should have been.

The stock market plunge has had the short-term impact of consolidation and layoffs, thus impacting IS expenditures that are people related. The increased volume and poor showing of orderly business has increased the potential for IS expenditures to either add more capacity and performance, or to evaluate how to have better-designed systems (professional services).

h. Insurance

This sector is unaffected by consumer-spending slowdowns. People will continue to buy insurance in our society. In addition the new COBRA law will make it easier for people laid off to retain medical coverage at a reasonable price, compared to the situation prior to COBRA legislation.

i. Medical

The medical and health care sector will be largely unaffected by consumer spending shortfalls. Elective surgery in the past would have been postponed, but with the new COBRA legislation, medical coverage is likely to be reasonably affordable, even in the event of a layoff or discharge.

j. Education

Educational institutions rely on donations and investment income to meet operating expenses. The stock market decline itself had a significant effect on income production. A consumer spending slowdown would likely impact donations viewed as discretionary.

k. Services

Discretionary services will be postponed in a slowdown. The use of tax professionals, lawyers, and real estate agents will be affected as general business volumes decrease. These individuals in turn will reduce or eliminate their Information Services expenditures.

l. Federal Government

The federal government expenditure levels themselves are given major blame for the stock market quake. The Street was tired of the deficit spending economy and similar federal government policies. The Gramm-Rudman-Hollings legislation for mandatory deficit reductions was already in place. The government will face the prospect of spending reductions, and if the consumer-spending slowdown occurs, perhaps lower revenues. Lower revenues would produce larger deficits. The only way out is to increase revenues, which, of course, means raising taxes. A tax hike would be a hard pill to swallow in light of the presidential election coming up.

m. State and Local Government

State and local governments tend to rely on income tax and sales tax as sources of revenue. These governments would both be impacted and would probably have more of an effect on IS expenditures than would the commercial sector in general. This large effect is principally due to the low level of automation in state and local governments (i.e., somewhat behind the commercial sector) and the efforts underway to catch up. These activities can generally be postponed.

State and local governments have been active users of the commercial systems integration approach to put together systems to help governments run more effectively. Multiyear programs are needed to handle the needs of the municipality. INPUT believes these programs will continue.

Oil prices will have a major negative impact in certain states—Alaska, California, Texas, Louisiana, Oklahoma,etc.—where oil production is a sizable part of the economy. It was widely believed that the oil business was coming back.

n. "Other" Industry-Specific

"Other" includes the hotel and construction segments, both heavily reliant upon discretionary spending and confidence in one's wage-earning ability. These segments would definitely be impacted and thus would their IS budgets.

The oil price decrease will assist the construction industry because of lower prices for some building materials. Reduced building costs could help reduce housing prices.

IV

Conclusions

IV

Conclusions

After reviewing the events shaping the U.S. economy, the state of the world economy, the political situation, and its own five-year forecast, INPUT could find no compelling reason to alter the Forecast Data Base at this time.

In addition, a quick survey of 40 senior IS managers indicated that 90% had no intentions to alter their plans or their spending in light of recent economic events.

INPUT reviewed the Information Services industry from 1977 through 1986 by delivery mode and compared growth to changes in the GNP, PPI, and CPI. There was no correlation identified. In 1985 and 1986 the Information Services industry as a whole grew, while the GNP remained flat. Previous to this, the total information services market tended to track the GNP, whereas each delivery mode did not.

In spite of discussion in this report covering a possible consumer spending slowdown and its effects on industry, there is no belief by INPUT that such action is likely. The cooperation of the rest of the free world economy to control interest rates, the repricing of the dollar to aid the trade deficit, and the discord with oil prices (courtesy of the OPEC countries) all serve to nullify the originally negative prognostications of the impact of the world stock market collapse.

INPUT suggests its clients watch the forthcoming economic indicators and understand how different economic events impact their businesses. INPUT does not recommend taking any action until the client is sure that his or her business base is affected. Overreaction, or a knee-jerk reaction, could cause clients to lose momentum and opportunities to continue growth in their business arenas.

INPUT's forecast will be modified if, and only if, it becomes apparent that such action is warranted. At this writing the economy seems to be on a positive track, despite the stock market debacle. However, all prudent business people must realize that the economy cannot continue growing indefinitely.

INPUT will report on this important element of the business environment in its newsletter to be initiated in January, 1988.

A

Appendix: INPUT Questionnaire

A

Appendix: INPUT Questionnaire

Confidential

Study Title:

Type of Interview:

Vendor	Telephone
On-Site	Mail
	User

Interviewer:______________________________________

Company:____

Address:____

____

____

Co. Type:____

Sales:____

No. of Empl:_____________________________________

Industry

Discrete Manufacturing
Process Manufacturing
Transportation
Utilities
Telecommunications
Distribution
Banking & Finance

Insurance
Medical
Education
Services
Federal Government
State & Local Government
Other Industry-Specific

Interviews

Name	Title	Telephone Number

Summary____

References____

Stock Market Impact
INPUT Survey of IS Managers

As everyone in business has observed, the stock markets around the world have suffered unprecedented declines. INPUT is a market research firm that specializes in the tracking and forecasting of the Information Services industry, a part of the Computer Industry. Information Services is essentially the "soft" part of the Computer Industry and contains the software and people portion services of the industry.

INPUT would appreciate a few minutes of your time to get your impressions of the stock market decline and how it may impact your buying patterns: immediately, in the near future and longer term. In appreciation for your comments, INPUT will send you an executive overview of the report it is writing on this subject. There are only 6 questions and the discussion should take 7 minutes.

Q1 What is the immediate effect of the stock market decline with regard to your company's information services expenditures? (but let the interviewee respond first)

Possible choices:

stop all spending
re-justify spending
postpone non-essential spending
increase spending
business as usual

Q2 Many economists/analysts are forecasting a recession.

What are your company's thoughts?

What are your personal thoughts?

Q3 If there is a recession, how would it affect your organization? By how much? (Possible answers: cut 10 percent, postpone an expenditure, lay-off people, use more outside services)

Q4 What are the specific signs that would convince you to take action?

Possible answers:

Executive committee dictate
Personal observation
Other

The previous questions were regarding recession. The following question is on inflation.

Q5 How would a significant increase in inflation affect your IS budget? How would it impact your external expenditures for software, professional services, outside processing or turnkey systems.

Q6 Last question:

How big is your IS budget now?
How much do you expect it to grow in 1988?
Is this pre- or post- stock stock market decline?
If pre-, what do you think it will be now in light of the stock market?
If post-, what was it before the stock market decline?
What is the revenue (or equivalent) of your company?

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I

Issues, Trends, and Events

I

Issues, Trends, and Events

A

Industry Consolidation and Restructuring

A major financial industry consolidation and restructuring is in process, offering opportunities for alert information system vendors.

- Purchase of S&L service companies.
- Acquisition of credit union and correspondent accounts.
- Network services offerings to associations, holding companies, and other institution groupings.

Bank mergers and acquisitions continue.

Foreign banks are active in the U.S. financial industry; their involvement as owners of U.S. banks is described in Exhibit I-1. However, the sale of Crocker Bank by Midland Bank of Great Britain to another U.S. bank, Wells Fargo, is an exception to this trend.

Securities and brokerage mergers, and consolidations continue, and may accellerate in the wake of the 1987 stock market turmoil. Shearson Lehman's acquisition of E.F. Hutton is the most recent such transaction.

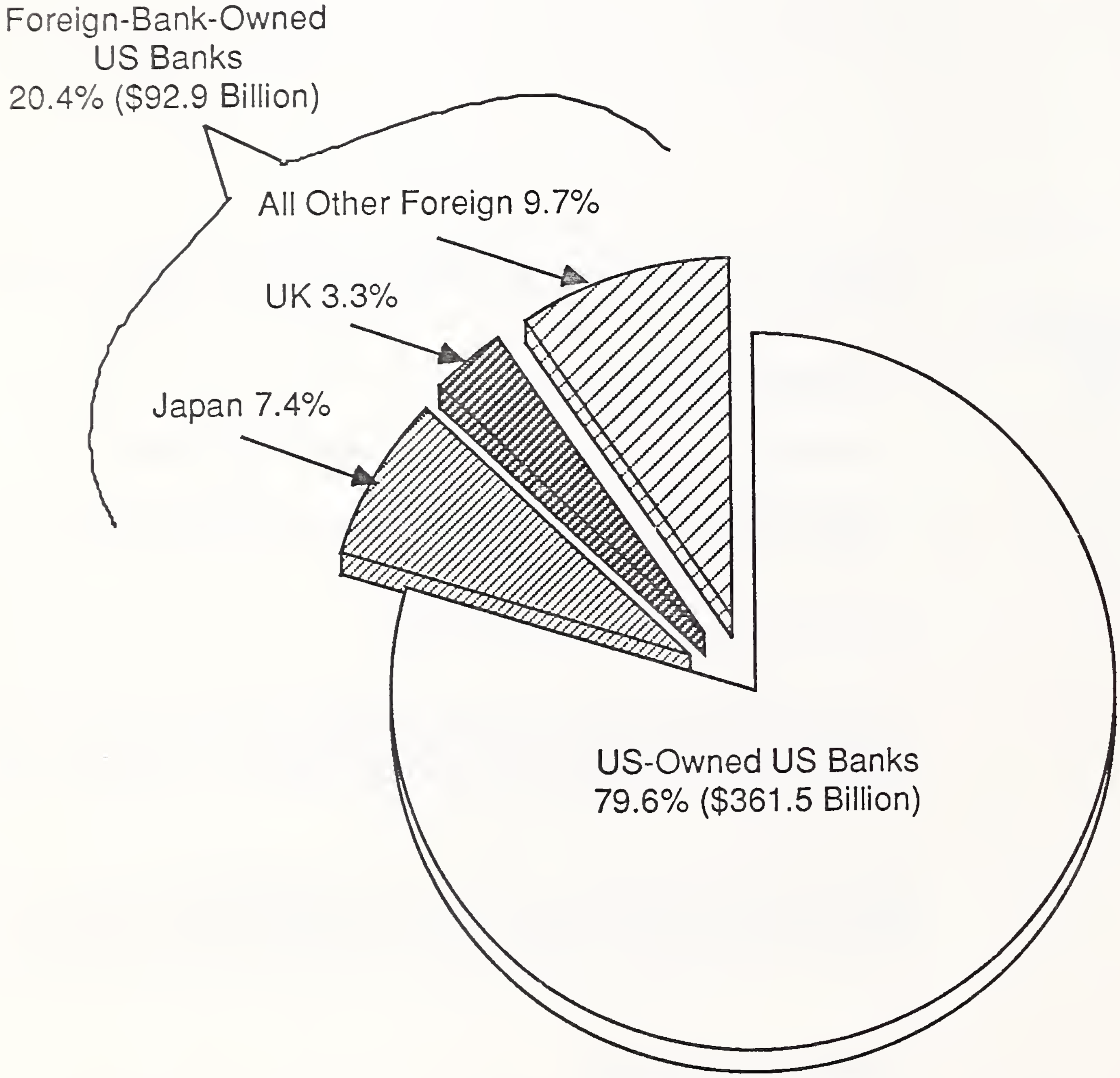
1. Interstate Banking

Interstate banking, now a de-facto situation, is due to be authorized through federal and state legislation in the forecast period.

- A banking deregulation bill introduced in the Senate in November 1987 would repeal parts of the Glass-Steagall act, allowing banks to participate in investment banking and securities underwriting. There is

EXHIBIT I-1

FOREIGN BANKS' SHARE OF THE US COMMERCIAL AND INDUSTRIAL LENDING MARKET



Note: Based on 6/30/84 C&I Loans at all Banking Offices, Excluding Finance Companies.

Source: American Banker.

resistance to such a change in the House of Representatives, and passage is not guaranteed. The election year climate and October 19 stock market crash have complicated the issues.

- South Dakota, Delaware, and Maryland are promoting interstate banking. In 1988, New Jersey, Ohio, and Michigan will allow takeovers by out-of-state banks.

- New England has authorized interstate banking between adjacent states.

- The federal government has permitted establishment of deposit-taking bank branches in selected states by out-of-state financial institutions.

The realignment of financial institutions on a national basis will require vendors to plan and offer services that are national in scope and market.

- State legislation, supported by the Supreme Court, is permitting rapid regional consolidation while preventing money center banks from being overly dominant.

- Independent banks are forming multibank holding companies or some new form of operational association to better handle electronic financial transactions.

Full national banking will be in place toward the end of the decade and into the 1990s.

- Some 7,000 banking entities will remain, about 45% of the 1985 total.

- One hundred or so very large money centers and regionals will operate against a grid of independent banks.

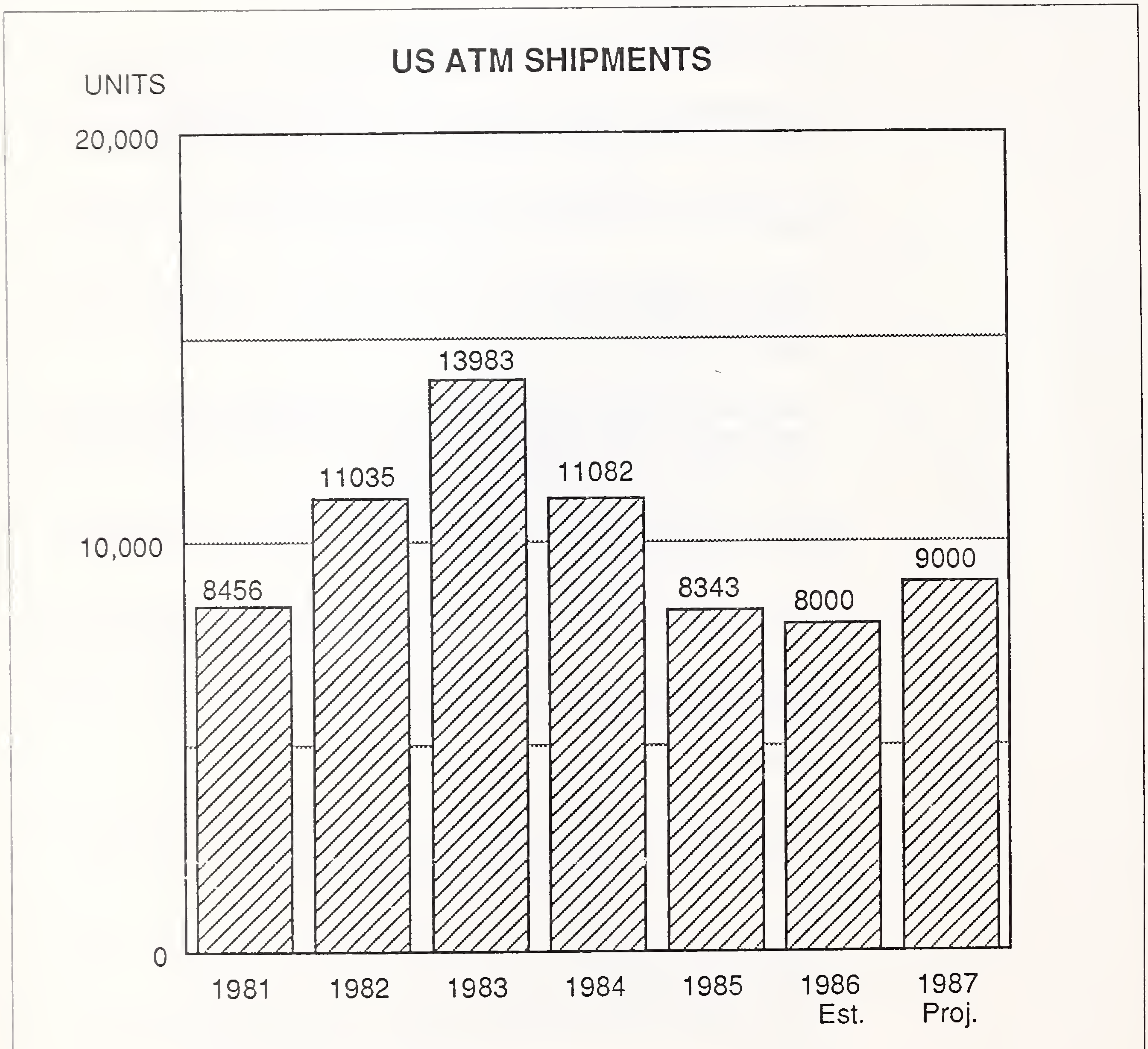
2. Extension of Financial Services

Financial institutions are extending their financial services offerings into the marketplace, replacing brick and mortar branches with electronic outlets in the retail marketplace. Examples include:

- Southland Corporation (7-Eleven stores) has already installed 1,500 ATMs in its stores.
- Safeway has installed over 600 ATMs in its supermarkets.
- Sixty ATMs have been placed in Eastman Kodak plant and office locations.

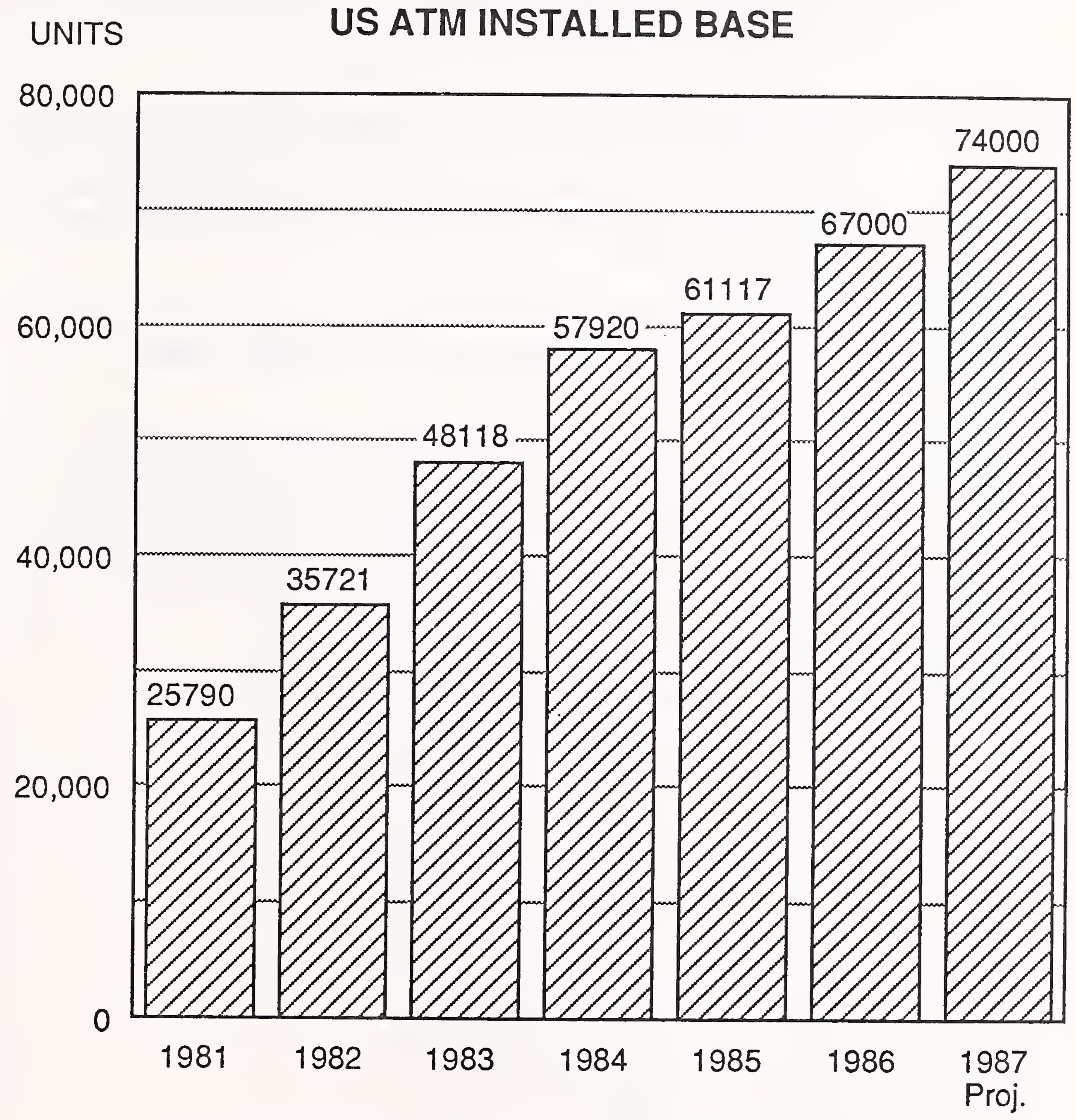
Over 100 shared ATM/POS networks, both regional and national, are consolidating and integrating into what will probably be less than 20 by the end of the decade. Development, integration, and management (FM) of shared financial transaction networks is a strategic target for processing services vendors with national networks. Exhibits I-2 through I-5 describe growth of the ATM markets.

EXHIBIT I-2



Source: Linda Zimmer, 1987

EXHIBIT I-3



Source: Linda Zimmer, 1987

The goal is full relationship-based banking, or offering a total portfolio of financial information services to a bank's clients.

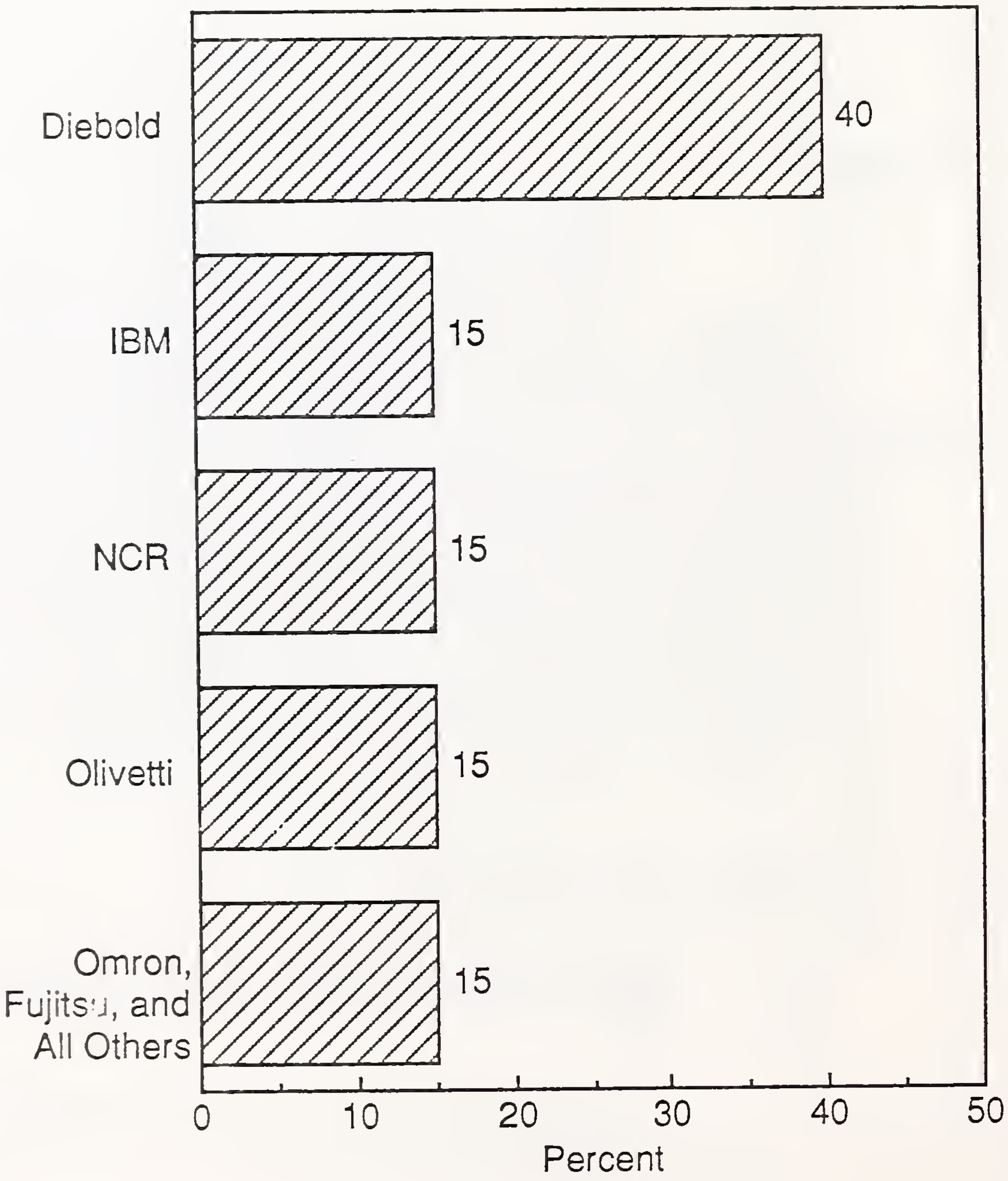
- Services might include brokerage services, investment advice, money market accounts, and other nontraditional types of services. Home banking is also one of these services being considered.

- Although over 60 financial institutions are involved in home banking pilots, only two– Bank of America and Chemical Bank–currently have significant programs operating. INPUT believes vendors should approach the home banking market with caution. Banking services should be offered in conjunction with other information services including brokerage, financial, and entertainment information offered through videotext gateway services.

A broadening of the types of financial services that can be offered is seen for virtually all financial intermediaries, including nonbank corporations whose financial subsidiaries are expected to eventually fall under the jurisdiction of regulatory authorities as a result of congressional, judicial, or regulatory action.

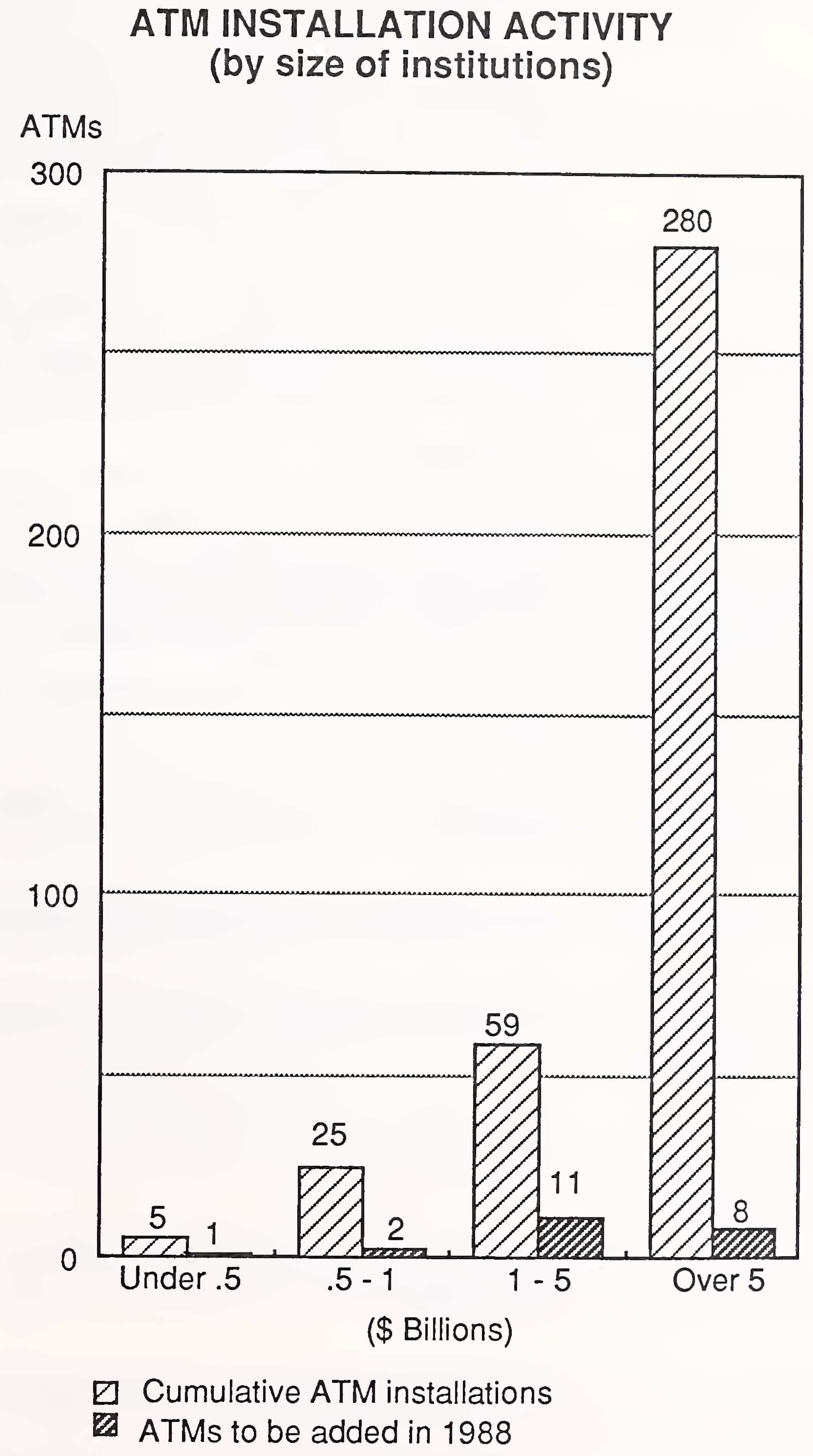
EXHIBIT I-4

US ATM MARKET SHARES, 1987



Source: Computers in Banking, 1987

EXHIBIT I-5



Source: Computers in Banking, 1987

3. Merchant Banking

The "Chinese Wall" separating commercial banking and investment banking, whose new name is "merchant banking" (as in England), will erode or be circumvented (through perpetual legal challenges). Money center banks will arrange for loans, then sell them to participants, taking the differential and loan servicing fees in an operation quite similar to that in residential and commercial mortgages.

Money center banks will be increasingly involved in marketing U.S. Treasury Department debt in international markets. The recycling nature of OPEC-held treasury debt and the rapidly increasing demand for U.S. Treasury debt in Europe that began in 1982 is evidence of this increase.

4. Deregulation

Until recently, the banking industry was the most heavily regulated industry in the country and one of the most decentralized. Banks are chartered by both the federal and state governments. All are inspected and regulated by governmental agencies.

There are three federal agencies primarily concerned with regulating banks:

- The Office of the Controller of the Currency (which regulates national banks).
- The Federal Reserve Board (which regulates bank holding companies and state banks that are members of the Federal Reserve System).
- The Federal Deposit Insurance Corporation (which regulates insured state banks that are not members of the FED).

Many states–with the federal government's approval–still prevent out-of-state banks from competing against locally owned (and mostly independent) banks.

The McFadden Act of 1927 still bans interstate banking by generally restricting national bank activities to the state in which the national bank is chartered.

The Douglas Amendment (1956) to the Bank Holding Company Act applied similar restrictions to bank holding companies.

The aforementioned Glass-Steagall Act (1933) continues to restrict the services banks can offer (i.e., the act prohibits the underwriting of stock offerings, insurance, etc.) and established a barrier between investment (such as corporate and personal trust) and banking (wholesale and retail), effectively creating a separate investment-banking industry. This barrier is likely to be breached to some degree in the 1988-90 period.

The above restrictions, lasting for over 40 years, spawned various groups (i.e., The Independent Bankers Association, State Banking Associations, Independent Insurance Agents, etc.), each with something to protect.

Equilibrium was attained by the checks and balances held by powerful interest groups. State and federal bureaucracies acted as bulwarks against change.

The FED, through Regulation Q, allowed banks (S&Ls and other regulated financial institutions) access to low-interest deposits.

- Banks paid market interest on certificates of deposit of $100,000 or more.

- Free or well-below-cost services provided to small depositors included free checking, several branches, many tellers, no service charge for bad checks, and monthly statements that included cancelled checks.

Until recently, a great majority of banks, local in nature, existed as much to exercise power as to make money.

- Most small banks are owned by their management (i.e., chairman, CEO, and local directors).

- By controlling credit, local banks often control the startup and expansion of small businesses.

The dramatic oil price increases in 1973 and 1979, with resultant inflation, are seen as the precursors of the now-accelerating changes in the banking and finance industry.

- The spread between the average deposit rate and money market rate so widened that investment firms began offering money market funds.

- Money market funds (themselves not insured) grew from just under $4 billion in 1977 to nearly $200 billion by 1981, a 50-fold increase in four years.

The Depository Institutions Deregulation and Monetary Control Act of 1980, which ordered Regulation Q to be abolished by 1986, is seen as a major influencing factor in changing the structure of the banking and finance industry.

Pricing deposits at competitive rates (formerly prohibited by Regulation Q) set in motion much of the turmoil currently being experienced in the banking and finance industry.

- The spread between the price of deposits (funds) and loans greatly narrowed (became negative for the S&L industry), forcing financial intermediaries to price services more realistically in relation to cost and to monitor closely the profitability of all product lines.
- With the "fat" gone, poorly managed financial institutions (particularly S&Ls) failed at ten times the rate of the previous decade.
- Financial institutions having control over costs, primarily through advanced technology, are coming through relatively unscathed.
- With the interest rate ceiling now lifted for consumer savings accounts, banks hope to see a return of capital.
- The Federal Home Loan Bank Board, which regulates S&Ls, is restructuring supervisory operations.

Exhibit I-6 illustrates the change in bank deposits, beginning in 1975.

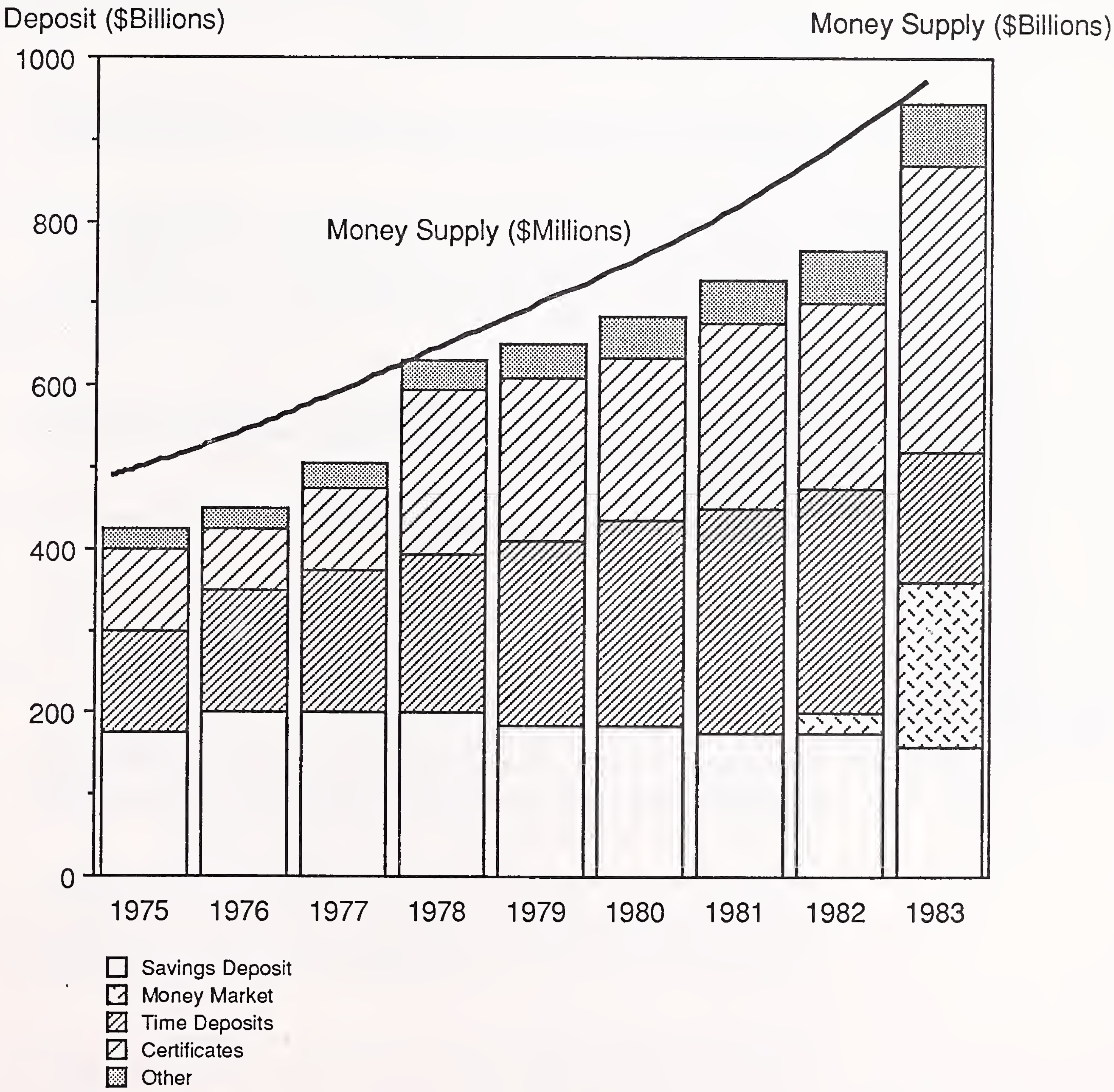
- Savings deposits, once the mainstay of total deposits, have fallen as a portion of total deposits in the money supply (M2); meanwhile the money supply has grown by a factor of 2.5 over an eight-year period.
- In 1975, less than one-third of total deposits were paid near money market rates (primarily certificates of deposit), whereas by 1983 over two-thirds of the total (primarily certificates of deposit and money market accounts) were at rates that offered a thin spread between interest cost and loan pricing.
- The aggregate interest rate paid on consumer deposits (a subset of total deposits) has nearly tripled over the past 20 years, going from 2.7% to 7.2% (1984).

Following the Continental Illinois debacle and its fire sale in the S&L industry, the political institutions restored a degree of reregulation in an attempt to restore stability to financial institutions.

- The FED and now the Federal Home Loan Bank are requiring banks (S&Ls) to increase working capital and equity.
- The federally backed capital note programs are removing negative net worth from financial institution balance sheets.

EXHIBIT I-6

DISTRIBUTION OF TOTAL DEPOSITS IN COMMERCIAL BANKS
1975 - 1983



Note: Banks were permitted to offer Money Market Accounts in December 1982
Source: Federal Reserve Board

B
Industry Instability

Financial institutions are becoming increasingly unstable, as shown in Exhibit I-7.

The FASB has proposed that financial institutions be required to report to shareholders the market value of their assets and liabilities, a change from current practice of book valuation. If enacted, this proposal would drastically reduce the perceived worth of many banks and thrifts, placing these institutions under greater pressure.

Securities firms are faced with the need for tighter cost control, layoffs, salary reductions, and product consolidations, after the chaos resulting from the October 1988 market crash.

- State S&Ls have failed in a number of states. California alone has 41 S&Ls that have been closed or are now operated by regulators. 60 S&Ls nationwide are operated under government supervision. Continuing losses in these S&Ls has caused strong criticism of the FHLB's rescue efforts.

- Over 12% of farm banks in the Midwest are reporting negative earnings, capital has fallen below 8% of assets, and failures continue to be reported at a regular rate.

- Capital is below the legal level for up to 20% of bank holding companies.

- Aggregate net worth of S&Ls is under 5% of assets.

C
Technology Issues/ Trends

1. Financial Transaction Networks

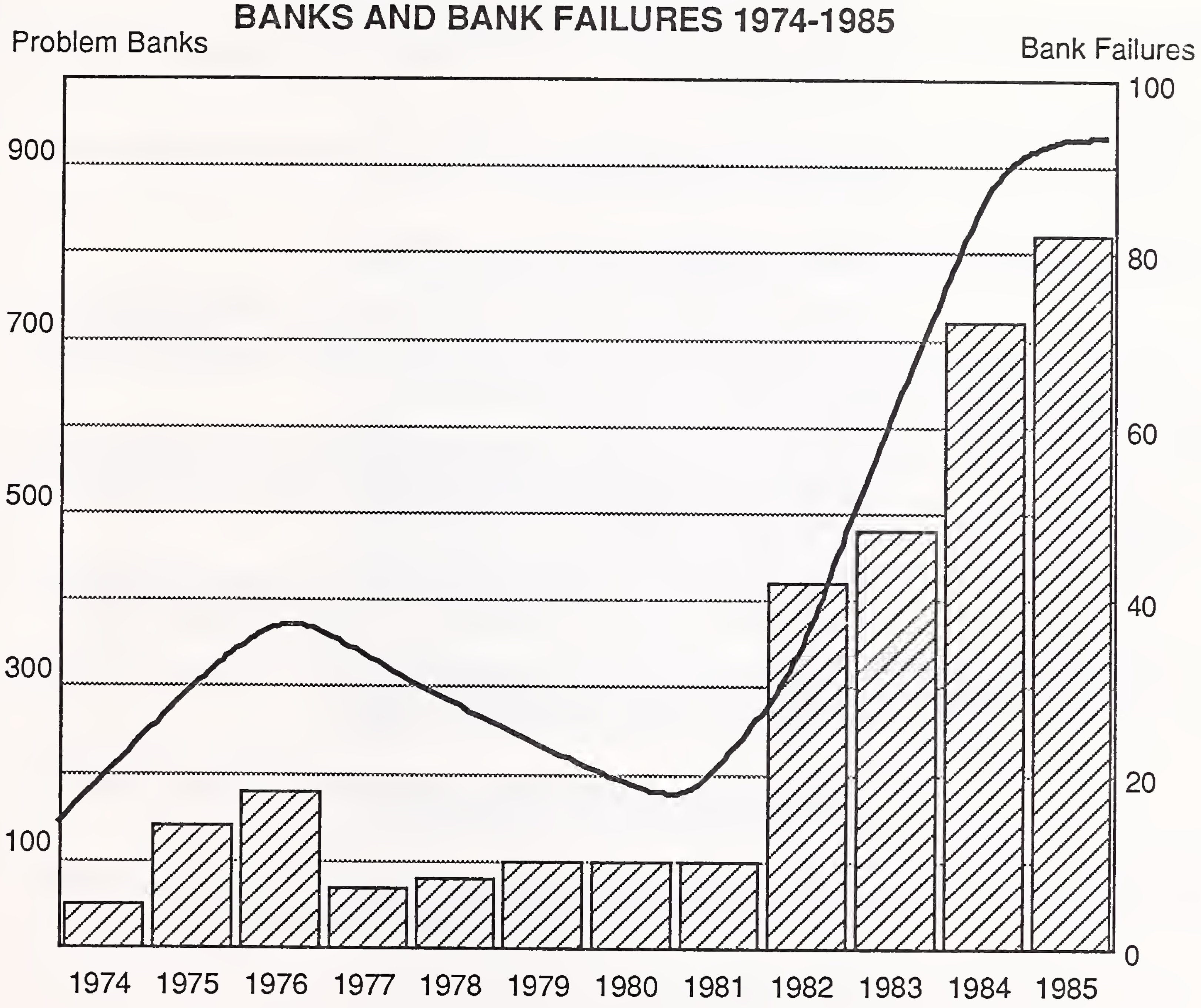
The growth in electronic transactions is staggering. It is difficult to see how current batch-oriented retail processing systems can successfully operate under the projected volume of electronic payments.

Creation of new electronic transaction networks is on the wane. Electronic switches permitting interchange are being implemented between critical services (i.e., VISA, MasterCard, and oil company credit cards). Significant electronic network consolidation is seen through the 1990s.

Although the private sector could well operate the funds payment system (both electronic fund and check payment), the FED will, in spite of the administration's protestations in favor of private enterprise, retain administrative control of the fund payment system, primarily as a means of controlling interest rates and the money supply.

EXHIBIT I-7

DISTRIBUTION OF FDIC-INSURED PROBLEM BANKS AND BANK FAILURES 1974-1985



— FDIC Problem Banks

▨ Number of Bank Failures

Source: Federal Deposit Insurance Corp.

Unlike Europe, the U.S. is seeing the development of POS systems in which the terms are under negotiation between the banks and the retailers. U.S. retailers such as Safeway, Kroeger, and Southland Corporation are willing to install their own ATM/POS systems.

Large banks will utilize their technology to further entrench themselves as service providers.

Statewide/regional POS EFT networks will continue to expand. Some consolidation can be expected.

2. Bank Debit Cards Versus Credit Cards

The bank debit card is in the long term the key to offering a wide range of financial and other consumer services through consumer (including home) financial transaction networks.

- MasterCharge and VISA are combining their substantial resources (5 million and 7 million cards, respectively) in supporting the "Entree" Debit/POS card system, to debut in 1987.
- Based on larger joint ventures of this type, a "national POS" system could emerge in the 1990s, supported by a few very large vendors.
- The number of bank debit cards outstanding is expected to exceed the installed base of credit cards in the 1990s.
- The transition will occur when consumers are adequately charged for the convenience of credit, including float.
- Non-bank-card providers–such as Onex, Sears, and Penney's–will emerge as low-cost, competitive transaction processors.

3. Optical Memories

Optical memory technology (even though set back by Burroughs' withdrawal from the marketplace) is finding first use in local environments for specific applications (but not by IBM in the mainframe environment).

- Coupled with microprocessor technology, optical memories permit cost-effective distribution of primarily inactive or sparsely changing data in very large data bases for reference use in the local environment.
- In the early 1990s IBM is expected to endorse optical technology for office systems, especially when the data is static.

4. Check Truncation

Check truncation using optical memory technology will be in widespread use in the 1990s.

- Optical memory systems will first be used at the first entry point in the clearance process.

- The technology will finally spread to capture check transaction data at the point of first presentation of the check into the payment system.

The general consensus of banking executives interviewed is that technology in the form of optical storage and image transmission will become cost-effective in the 1989-1990 timeframe.

The problem appears to be as much with consumer acceptance of the nonreturn of the original check as it is with the in-place electronic networks necessary to clear the still slowly growing volume of check transactions. As banks are forced to price services based on true cost, and the consumer is billed for his desire to have the checks returned (versus check images or a descriptive statement (GIRO), then check truncation, which will save hundreds of millions in payment systems cost, will become widespread.

Banking executives report that check truncation has been effective in selected areas, particularly when offered with packaged financial services.

5. Personal Computer Use by Investors

Personal computers have enabled individual investors to become much more active in managing their investment portfolio, as well as their IRA and Keogh accounts.

- Interaction between the individual and the market either through discount brokerage or full-service brokerage houses is becoming widespread.

- Computer services vendors can benefit from the expanding market through providing software products and network services, including on-line data bases for analysis and, more recently, active trading.

- Remote banking and financial analysis by PCs in businesses and homes is a growing potential market. With millions of PCs installed, this is a market awaiting cost-effective, easy-to-use solutions.

Many applications formerly running only on mainframes or minicomputers are appearing on powerful, low-cost PCs. These applications include:

- Asset/liability management.
- Funds transfer accounting.
- C.D. accounting.
- Planning and budgeting.
- Loan processing/profitability analyses.
- Installment loans.
- Commercial loan accounting.
- Mortgage loan accounting.

PC-based systems will appeal to many smaller institutions, and proliferate informally within larger organizations as well, for departmental operations.

6. The Smart Card

There is a good deal of publicity associated with the microprocessor-imbedded or "smart" bank card. MasterCard conducted two pilot tests in the fall of 1985.

- Current smart cards cost between 8 and 15 times more than plastic magnetic strip cards, wear out 10 times sooner, and are easily counterfeited by a determined adversary.

- INPUT's assessment is that smart cards are not likely to be actively used in financial applications before at least 1990.

7. Security

Fraud is a major issue for credit card transactions and will soon become so for debit card transactions. Amounting to nearly $500 million in 1984, credit card fraud is currently rising over 13% annually. Major opportunities exist for financial transaction systems that authenticate the card and closely tie a valid card with a valid user. Information services vendors must team with security technology vendors to offer secure financial transaction network services.

Validation of the message originator and authentication of the message itself, coupled with adequate encryption, are seen as the only viable way to secure electronic transaction networks in the wholesale environment.

- The DES algorithm is seen to be no longer invulnerable to attack by powerful 32-bit microprocessors.

- Public key systems are seen to be effective, but are vulnerable in the "people sense," as related to key management and distribution.

- Consumer validation and message authentication requiring on-line operation are seen as the only viable ways of securing consumer transaction systems involving large dollar amounts (i.e., home banking, CMA accounts, etc.).

8. Artificial Intelligence Products

AI-based systems are beginning to appear to support decision-making where financial expertise cannot be easily transferred to larger groups of relatively inexperienced employees in teller and loan-processing and approval positions.

9. EDP Expenditures Demanded

To remain competitive, financial institutions must automate aggressively even if the cost of such automation may be difficult for them. Automation provides major opportunities for third parties to deliver automated solutions, in the form of software packages, facilities management, turnkey systems, and remote processing services.

Although current EDP expenditures represent 33% of financial institution spending in 1987, by 1990 that number will rise to 38%.

10. Software Obsolescence

Many of the larger institutions installed back-office applications in the 1970s, and these aging systems must be replaced in the near future.

Since most of these applications were standalone, not integrated with front-office and general management requirements, they are "islands of automation," not integrated systems.

Software and service companies will benefit from the major upgrading and expansion of systems occurring now and the near future.

II

Market Forecasts

II

Market Forecasts

A

Introduction

1. Rising Information Expenditures of the Banking and Finance Industry

The Banking and Finance sector will continue to offer excellent information services opportunities as the U.S. moves from an industrial to an information society.

The SIC for this market sector is 60: commercial banks (602), savings banks (603), savings and loans (612), finance companies and credit unions (614), security and commodity brokers (622), holding companies (671), and investment offices (679).

INPUT divides the Banking and Finance sector into four segments: commercial banks, savings and loans, security and commodity firms, and other financial institutions.

The category of other financial institutions includes: credit unions, federal reserve banks, finance companies, mortgage banking companies, and miscellaneous financial institutions.

Banking and financial institutions account for more expenditures on information services than any other industry group. Banks and financial institutions also spend a larger share of their total electronic data processing (EDP) expenditures on information services than do most groups. The Banking and Finance sector has led the way since the early 1960s, and the average annual growth rate of 16% will maintain this position through the 1990s, as shown in Exhibit II-1.

2. The Trend toward Electronic Processing

There is little doubt that the industry is continuing to become "electronic." Examples of this significant trend are:

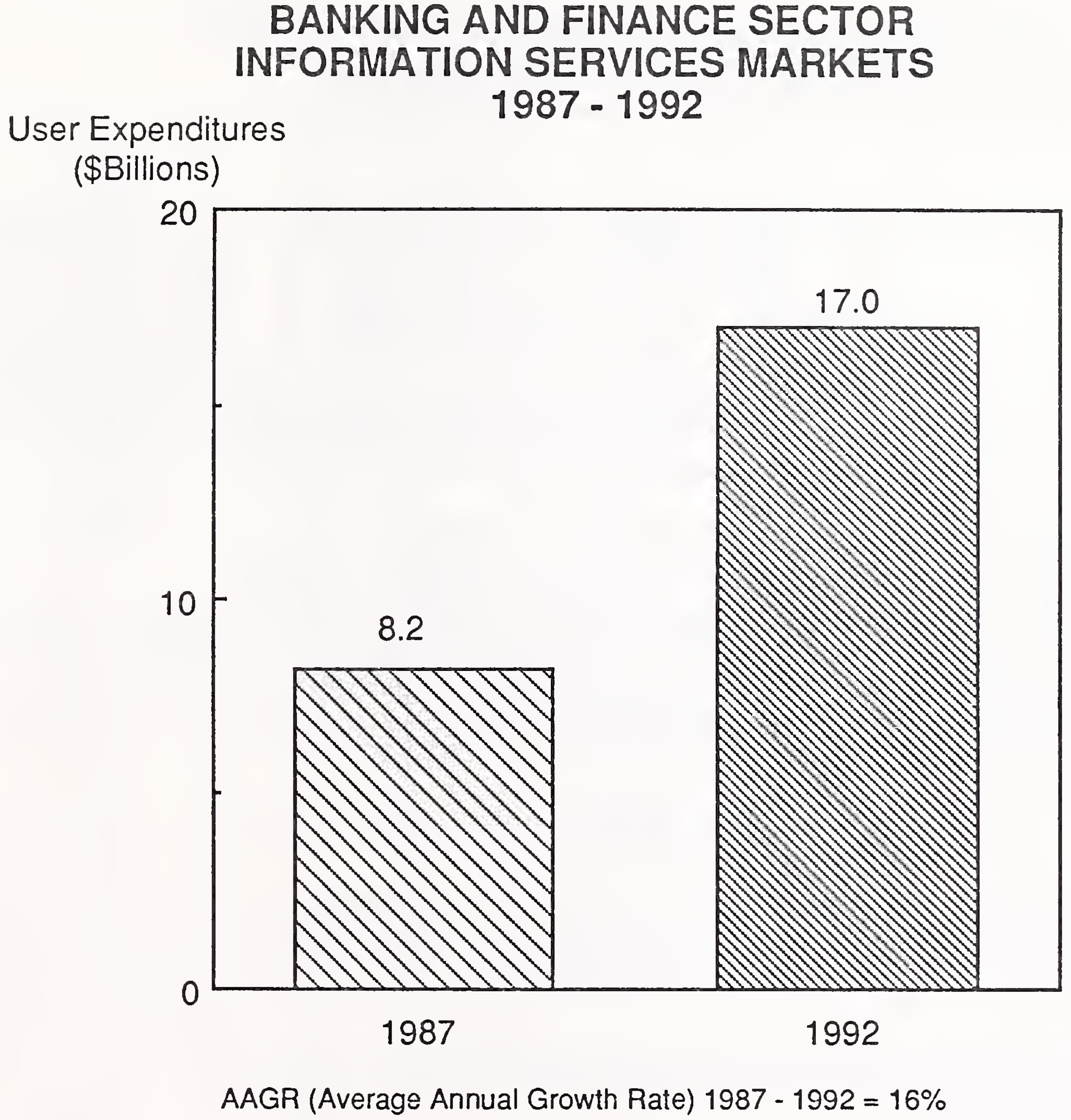
- Over 20 billion electronic transactions were processed in 1985. The annual volume is expected to exceed 65 billion transactions within the next decade.
- Commercial bank personnel growth of over 3% annually during the 1970s has declined to just over 1% annually in 1985 and is expected to decline to just under 1% by the end of the decade. Bank deposit growth of nearly 8% annually is now being supported by increased information services expenditures.
- Any personnel growth within this segment will occur in new banking areas; the number of people in traditional banking areas will actually shrink.

3. The Changing Structure and Blurring Boundaries of Financial Institutions

The changing structure of financial institutions, as well as their blurring boundaries, greatly widens opportunities for alert vendors offering information services across industry subsectors. Lines of demarcation are blurring not only among financial institutions, but between financial and commercial companies, as shown in Exhibit II-2.

- Sears, Roebuck and Company has more retail outlets than any financial institution. Sears is second only to Merrill Lynch in the number of full-service brokerage accounts and second to Citicorp in consumer loans.
- Bank of America Corporation has nearly twice as many discount brokerage accounts as its nearest competitor, Fidelity Company, a more traditional securities execution vendor.
- American Express Company, an emerging financial conglomerate, is second only to Fidelity Company in the number of mutual fund accounts and to Merrill Lynch Company for the popular Cash Management (CMA) financial account.
- Prudential Insurance Company of America has more commercially financed receivables than does Manufacturers Hanover Corporation, a New York money center bank.
- Household International, parent of Household Finance, is second only to Citicorp, the nation's largest bank, in consumer finance receivables.

EXHIBIT II-1



B

Sector Forecast, 1987-1992

1. Commercial Banks

As shown in Exhibit II-3, commercial banks represent the largest of the four sectors that make up the Banking and Finance sector total information services market. With user expenditures approaching 4.1 billion, the commercial banking sector represents 50% of total user expenditures in 1987.

EXHIBIT II-2

LEADING PROVIDERS OF BANKING AND FINANCE INDUSTRY FINANCIAL SERVICES

Company	Financial Services Outlets (000)	Discount Brokerage Accounts (000)	Number of Mutual Fund Accounts (000)	IRA & Keogh (000)	Full-Service Brokerage Accounts (000)	Cash Management Accounts (000)	Consumer Loans ($000)	Residential First Mortgages ($000)	Commercial Finance Receivables ($000)	Consumer Finance Receivables ($000)
Travelers Company	120									
Sears, Roebuck and Company	7				1,345		12,000			
Bank of America		650		665				16,500		
Fidelity Company		375	1,500							
American Express Company			1,413			172				
Merrill Lynch & Company				800	4,800	1,000				
H.F. Ahmanson Company								15,400		
Prudential Insurance Company of America									1,545	
Manufacturers Hanover Corporation									1,100	
Citicorp							29,000			8,200
Household International Corporation										4,727

Source: American Banker

- These services include correspondent bank processing of nearly $700 million, and credit card authorization and check guarantee services of another $365 million.

- The overall annual growth rate of commercial bank user expenditures will be sustained above the industry average as banks continue to go on-line as they increase the array of financial services delivered through electronic media.

- Large money center banks will dominate this segment as they move in to replace many of the failed S&Ls.

2. Savings and Loans

Operating in volatile financial markets and with profitability increasingly sensitive to interest rate spreads, the Savings & Loan segment represents just over 10% of total product expenditures.

A major S&L restructuring appears inevitable during the forecast period. This restructuring will offer new opportunities but restrict annual growth to just under 14%. Computerized mortgage networks, a new computer services opportunity, will become widespread during the forecast period. By offering lendable funds on a national basis, mortgage market network services will be in great demand because they reduce market interest rate imperfections.

3. Securities and Commodities Organizations

The Securities and Commodities market segment (currently just over 13% of product expenditures) is a heavy user of cross-industry services, including on-line databases and VAN services.

Industry-specific applications will benefit from national, if not worldwide, electronic trading and from security information services to individuals.

Cross-industry growth will result from the proliferation of personal computers as workstations throughout the dealer and investor marketplace.

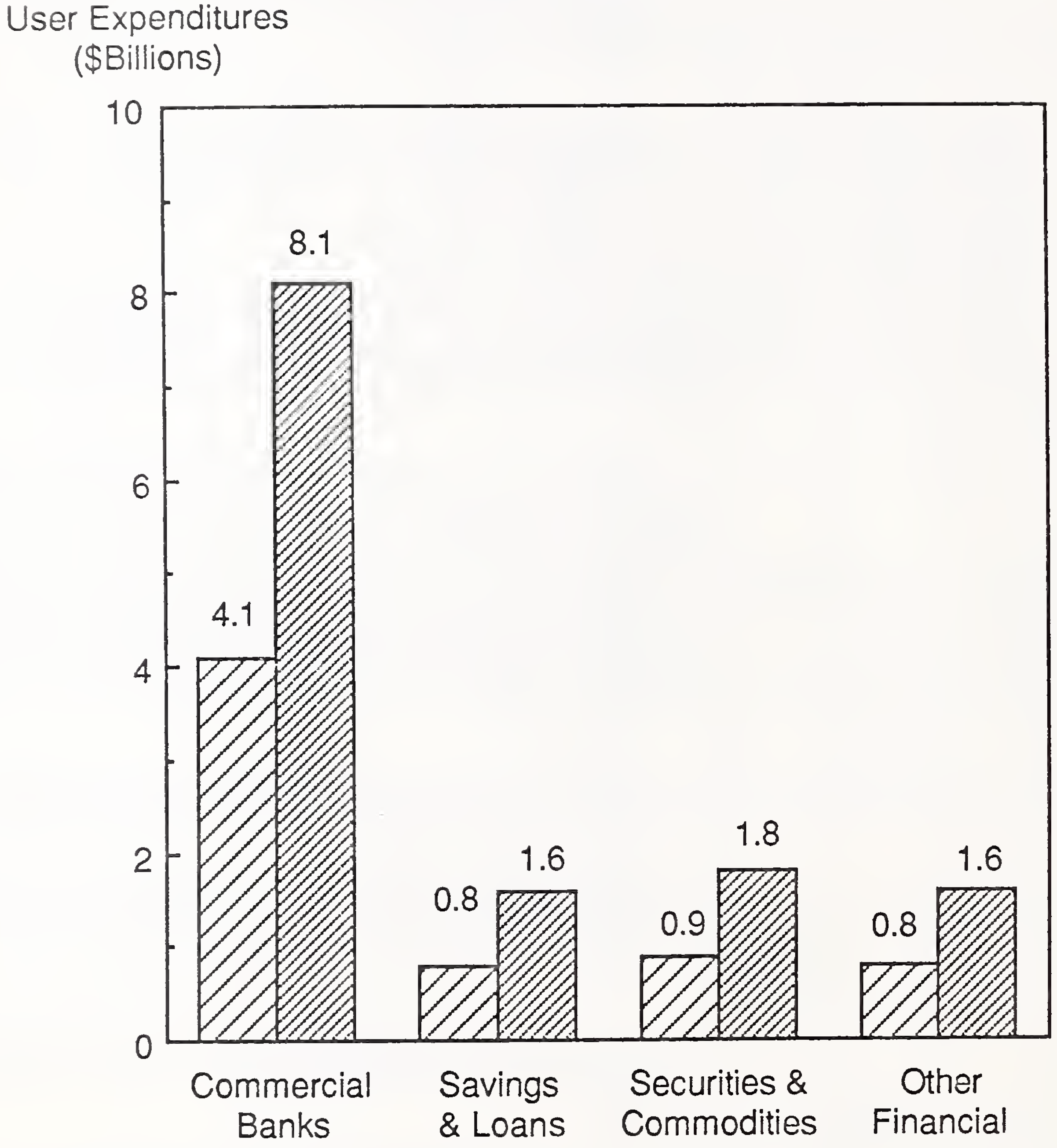
Consolidation and control of operating costs, especially to employer corporations, will be high priorities in 1988.

4. Other Banking/Finance Institutions

Other financial institution expenditures, nearly 12% of the 1987 product, are related to credit unions, mortgage banks, finance companies, the

EXHIBIT II-3

BANKING AND FINANCE SECTOR INFORMATION SERVICES BY INDUSTRY
1987 - 1992



AAGR 1987 1992	Commercial Banks	Savings & Loans	Securities & Commodities	Other Financial
	15%	14%	16%	16%

▨ 1987
▨ 1992

AAGR: Average Annual Growth Rate
Note: Professional Services not included

Federal Reserve and Federal Home Loan Banks, and miscellaneous financial institutions.

Formation of the Credit Union Central Bank gives credit unions central bank funding and services similar to those of the Federal Reserve and Federal Home Loan Bank, including funds availability, discount, share draft processing, and member borrowing.

Operation of Automatic Clearing Houses (ACH), ACH network services, and local check guarantee associations by the private sector in place of the Federal Reserve are examples of new information services opportunities in this sector.

C

Industry-Specific Services Delivery Mode Forecast, 1987-1992.

1. Processing Services

The Banking and Finance segment is a heavy user of processing services. The combination of remote computing services (RCS), batch processing, and processing facilities management, as shown in Exhibit II-4, is 67% of total 1987 industry-specific information services expenditures. The shift of existing applications to distributed on-site mini- and microcomputers, plus new opportunities, will sustain processing services growth at 15% during the forecast period.

It is clear that the market for check/credit card processing is going electronic. Installation of shared POS/ATM networks are extending banking and finance institution operations into the consumer marketplace. Over 25% of existing ATMs are in shared networks. The major portion of the shared installed base is located at supermarkets, truck service centers, casinos, and more recently in corporate buildings.

2. Applications Software

The applications software segment will grow rapidly as a result of a number of factors:

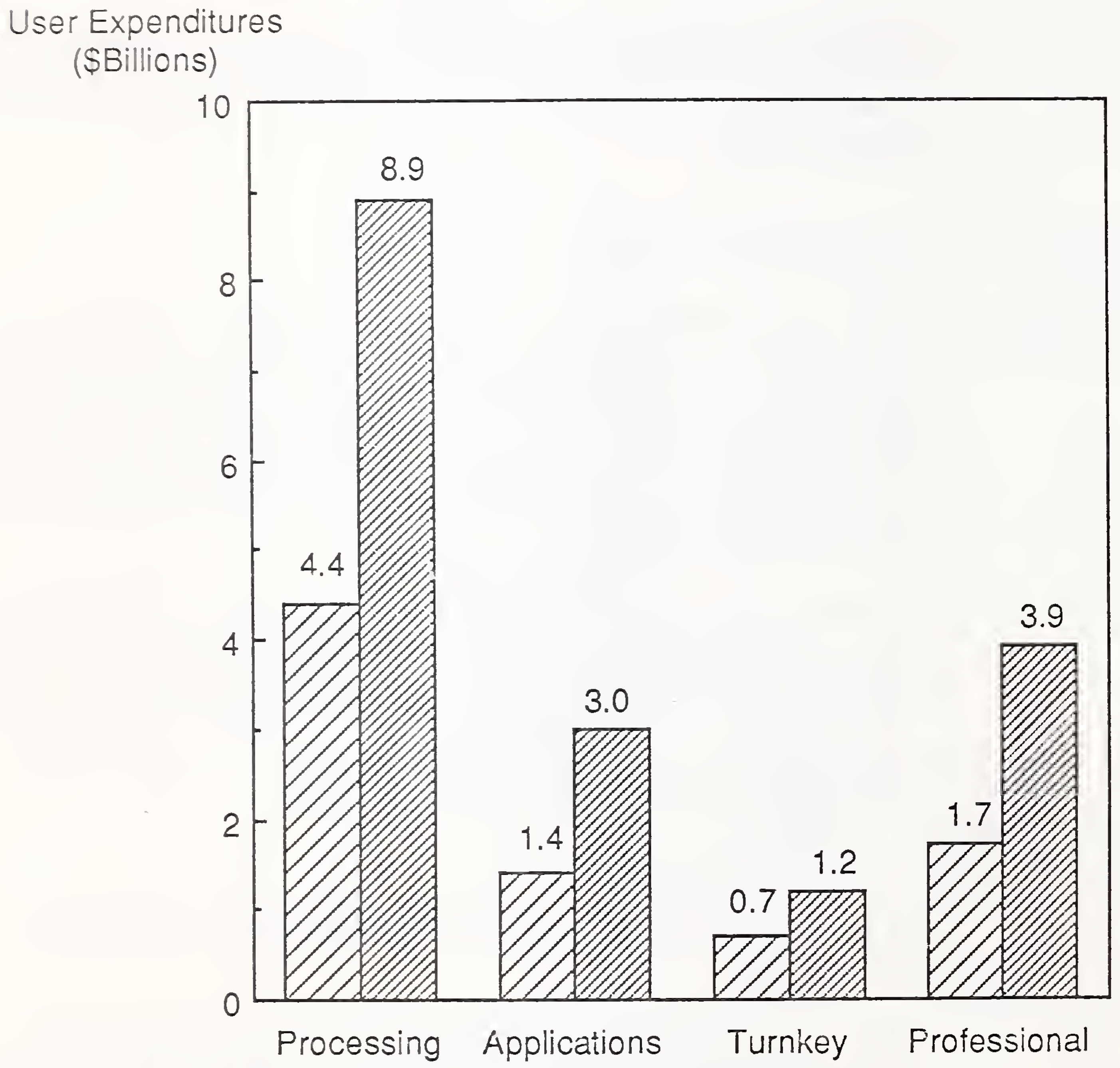
- The growing need for financial institutions to integrate applications about an expanding customer data base to successfully market an increasing array of financial services.

- The need for on-line interactive software to process an increasing volume of electronic transactions.

- The problems with Anacomp, and more recently Hogan Systems, notwithstanding, widespread use of electronic transaction systems depends on financial institutions having on-line interactive capability.

EXHIBIT II-4

BANKING AND FINANCE SECTOR INDUSTRY-SPECIFIC INFORMATION SERVICES MARKET BY DELIVERY MODE, 1987 - 1992



AAGR 1987 1992	Processing	Applications	Turnkey	Professional
	15%	17%	11%	18%

▨ 1987
▨ 1992

AAGR: Average Annual Growth Rate

Microcomputer software has found wide acceptance in the Banking and Finance sector, resulting in an annual growth rate of 28% over the five-year forecast period, with 1992 expenditures forecast at an impressive $643 million. A few of the many examples are:

- BankLine II, Chemical Bank's corporate cash management service, is now available on the IBM PC.

- Mainline processing for community banks will soon be available on the IBM PC. IBM is in joint software development with the American Bankers Association.

- IBM and Tandy PCs are being widely used in agricultural banks in the Midwest using software developed by Agri-System Development, Inc. and FBS Systems, Inc.

- Exhibits II-5 through 7 show mini- and mainframe computer usage in the banking industry.

3. Turnkey Systems

Growth rates as high as 18% were forecast in the 1986 report. A more constrained growth of 11% is now forecast. The growth in turnkey systems in the Banking and Finance segment results from:

- A concerted effort on the part of hardware vendors to sponsor independent service organizations (ISO) and value-added reseller (VAR) arrangements.

- PCs are increasingly employed for specialized banking functions, such as letters of credit, loan origination, secondary mortgage packaging in larger financial institutions, and branch automation.

- Microprocessor-driven turnkey systems are more cost-effective for community banks, credit unions, and other smaller financial institutions.

- Overall growth is inhibited by the volatility of this delivery mode market and by the relative "frailty" of many of the vendors.

- Declining costs of equipment and software have had a strong negative effect on turnkey systems' growth ratings. Additionally, the increasing power of micro- and supermicro- computers allows them to perform many of the jobs allocated to minicomputers (at much higher prices) in the recent past.

EXHIBIT II-5

MAINFRAME USAGE BY VENDOR

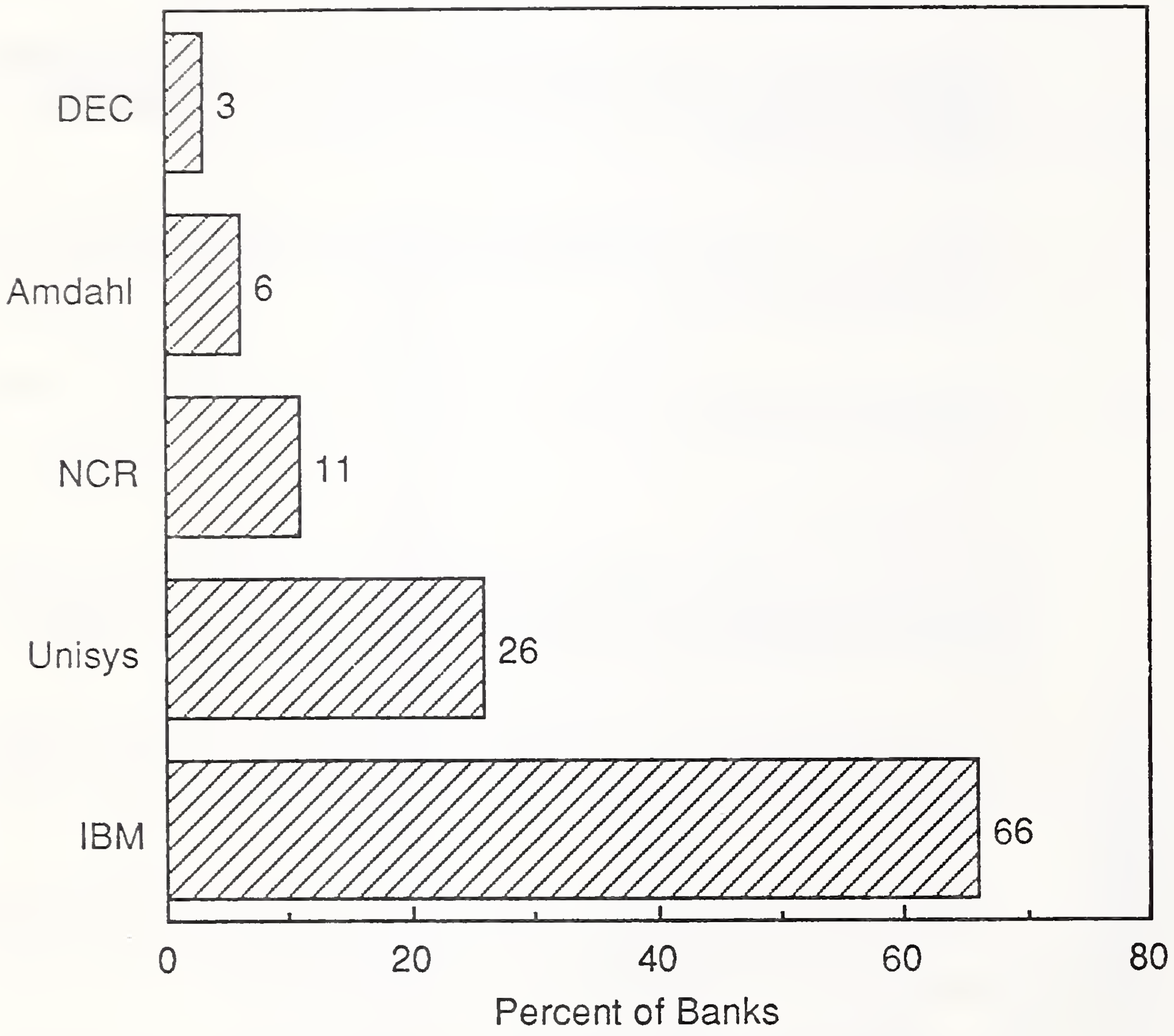
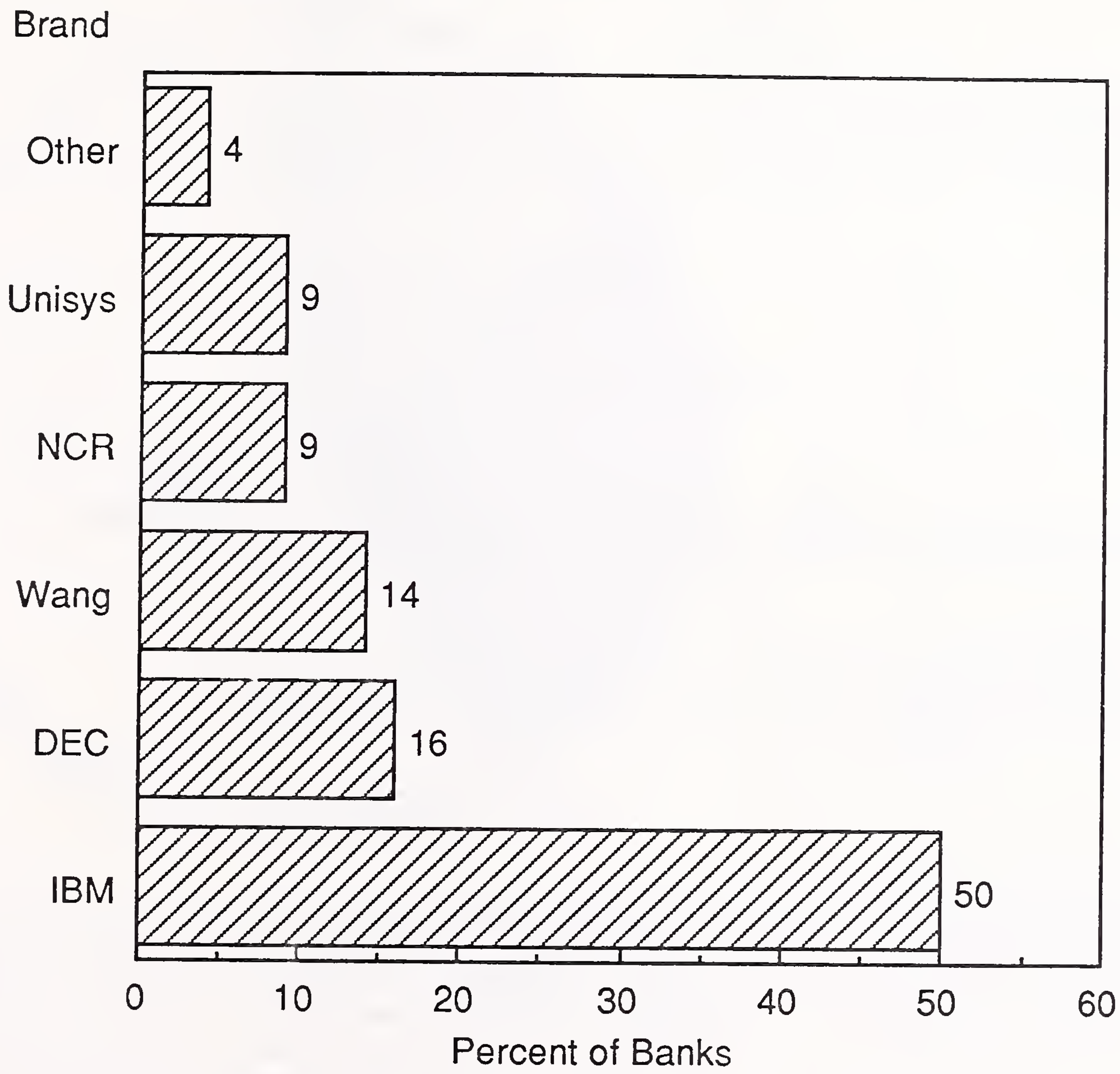


EXHIBIT II-6

MINICOMPUTER USAGE BY VENDOR

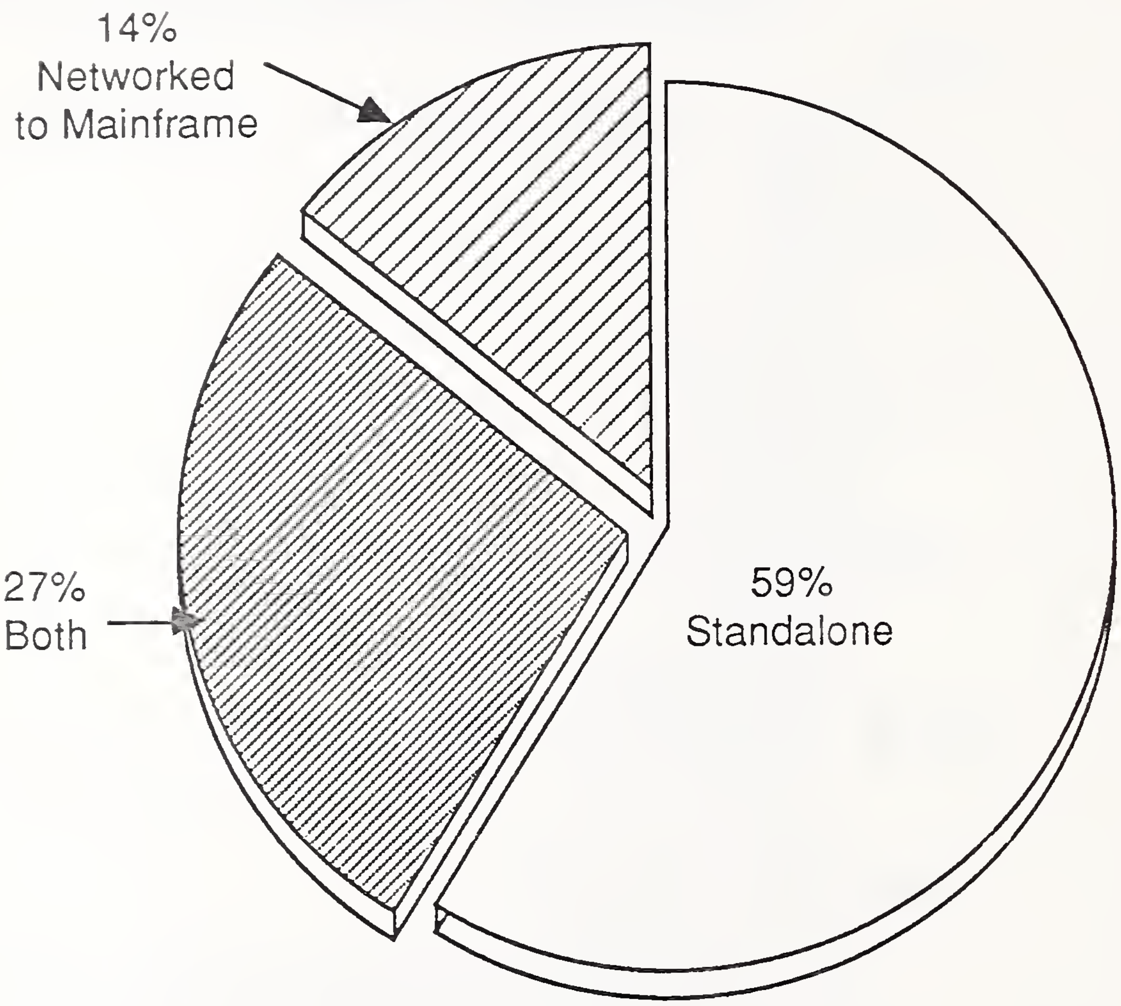


Although holding a commanding lead with minicomputers in banks, IBM has more competitors in this hotly contested market. IBM minis were found in half of the banks polled, with DEC and Wang following with 16% and 14%, respectively. Unisys and NCR minicomputers, predominantly used in small banks, were found in 9% of banks queried. Total percentages are above 100% due to multiple responses.

Source: Computers in Banking, 1987

EXHIBIT II-7

HOW MINICOMPUTERS ARE USED IN BANKS



Minicomputers, often used as departmental processors, still have relatively few links to mainframe computers, research reveals. Although most banks' minis operate in a standalone mode, 14% of respondents reported midrange computers having links to hosts, and 27% of respondents said that they have both net- worked and standalone machines. Larger banks were slightly more likely to network than were community banks.

Source: Computers in Banking, 1987

D

Demographic Forecast, 1987-1992

The Banking and Finance industry is in the process of restructuring and change. The net result will be somewhat fewer sale/site opportunities, with a corresponding increase in revenue potential per site.

1. Institutions Decline

The number of institutions is, as shown in Exhibit II-8, expected to drop to just under 30,000 by 1990, an overall decrease of 28% over the five-year forecast period. By 1990 there will be:

- 10,300 commercial banks.
- 2,400 savings institutions.
- 13,000 credit unions.
- 315 security and commodity brokers.
- 700 mortgage bankers.
- 12 Federal Reserve Banks.
- 12 Federal Home Loan Banks.
- 2.976 other financial institutions, including investment companies, development banks, and cooperatives.

It is possible that a combination of competition, deregulation, and severe economic recession could accelerate restructuring, thus reducing the number of sale/site opportunities well below 20,000.

2. Employment Estimate

The slow growth in the number of employees in the Banking and Finance segment attests to the impact of automation on banking and finance institutions. Employment growth for the 1982-1985 timeframe was only 1.3% annually. The growth will drop to less than 1% annually for the 1987-1992 timeframe, in contrast to nearly 8% annual growth in aggregate assets.

1985 employment was estimated at:

- Commercial banks - 1,640,000.
- Savings institutions - 310,000.
- Credit unions - 370,000.
- Security and commodity brokers - 120,000.
- Mortgage bankers - 111,000.
- Other financial institutions - 420,000.

EXHIBIT II-8

DEMOGRAPHIC ANALYSIS
BANKING AND FINANCE SEGMENT

Item	1982	1985	1990
Number of Institutions	43,183	41,305	29,740
Number of Employees	2,810,000	2,973,000	3,122,000
Assets ($Billions)	3,158	3,769	5,352
Information Systems Departments Spending ($Millions)	6,316	8,709	13,277
Information Systems Departments Spending per Employee	2.25	2.93	4.25
End-User Information Systems Spending ($Millions)	322	757	1,475
End-User Information Systems Spending per Employee	.12	.25	.47

III

Competitive Developments

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Competitive Developments

A

Introduction

Complex supplier and competitor relationships are proliferating in the financial services market due to the changes and new opportunities in the banking and finance segment.

Now banks, securities firms, consumer financial companies, credit unions, and retailers provide financial services directly to consumer customers.

Corporate banking is also increasingly competitive on the lending side.

- Through the commercial paper market, industrial corporations (i.e., IBM, General Motors, etc.) can obtain financing at better money market rates than commercial banks can offer their most credit-worthy customers.

- Money market instruments marketed by investment bankers (including "junk-bonds") often result in money market rates well below those that can be profitably offered by financial institutions.

Commercial banks have traditionally been providers of information services to their correspondents, to corporate clients, and, on an increasing basis, through their correspondents to the correspondents' corporate clients.

In a recent study on correspondent bank processing, INPUT determined that commercial banks provided well over one-third of the computer services to predominantly smaller banks:

- Services include demand deposit accounting, check clearance, check processing, savings, loans, administrative/CIS, and electronic transactions including ACH and ATM/POS bank card services.

The bank information services market segment is seen to be in the process of consolidation. Many banks are involved in selling data processing services to other financial institutions and computer services vendors. However, a number of regional banks have elected to expand their positions in the financial information services marketplace.

As another method besides acquiring "sick" S&Ls to gain on interstate presence,
most of the major money-center banks have been testing interstate banking through the establishment of a limited number of "nonbank banks."

- The Supreme Court decision (related to Dimension Financial Corporation of Denver) limiting the Federal Reserve's regulatory power over limited-service banks is seen as opening the gate for a deluge (well over 500) of bank holding company applications for limited-services banks.

- Conflicts between Congress and the President, and between the House and the Senate, are seen as preventing the successful passage of legislation to limit bank expansion, until after the 1988 Presidential election.

Invasion of U.S. international lending markets by non-U.S. banks will not be a significant threat to U.S. financial institutions.

- Foreign ownership of U.S. banks is seen as a necessary and beneficial condition to the orderly conduct of international financial markets.

The numbers of vendors involved in the market are substantial.

- Over 400 information services and commercial bank vendors offer industry-specific information services to commercial banks. The market is characterized by a large number of specialized vendors with no one vendor dominating the marketplace. Major vendors are ADP, NCR, EDS, CDC, Systematics, American Express, UNISYS, GEISCO, IBM, MTech, Mellon, Citicorp, and Chase.

- About 200 vendors supply savings and loan institutions. The primary vendors are NCR, CDC, EDS, UNISYS, ADP, IBM, Citicorp Dataline Service, and Florida Information Management.

- Over 40 vendors market to security and commodity firms, with Quotron Systems and ADP holding major shares. Telerate, Reuters, Allied Information Systems, McGraw-Hill, Bradford, Chase, IDC, and Dow Jones are competitors. Note: Quotron was acquired in 1986 by Citicorp.

- Finally, some 150 vendors serve the remaining financial categories. Leading vendors in other categories are CDC, EDS, Users Inc., Chase, Dial Systems, Citicorp, UNISYS, and NCR.

These suppliers are of three basic types–financial institutions, information services vendors, and commercial institutions.

The 1987 market shares of 34 leading vendors are given in Exhibit III-1; the company profiles of 14 vendors follow.

Significant competitive activity by additional participants in the industry is discussed by vendor type.

B

Vendor Profiles

1. Automatic Data Processing (ADP)

a. Products and Services

ADP provides a wide variety of information services to commercial banks, through the Electronic Financial Services (EFS) and Network Services divisions. Services include:

- Mainline processing for some 100 banks through regional centers.
- Integrated systems for trust and other applications.
- Payroll services on a private-label basis.
- ATM network services to financial and retail markets. These services support proprietary and shared networks. 25,000 ATMs and 35 ATM networks are connected to the ADP networks.
- Home banking, pay by phone.

ADP provides remote processing services for over 200 S&Ls through interconnected centers. New services include the ability to access shared ATM networks.

ADP offers remote processing and shared ATM networks to credit unions; ADP has placed ATMs in over 400 7-Eleven stores.

One of the leaders in brokerage back-office processing, ADP now includes market trade data through its Trend Setter system, as well as a service that links users to Value Line and other research sources.

Treasury Management systems allow treasurers to rapidly concentrate and invest capital via electronic transfer and record-keeping.

EXHIBIT III-1A

MARKET SHARE-SELECTED BANKING/FINANCE VENDORS, 1987

Vendor	User Expenditures ($M)				Total Revenues ($M)	Total Market Share (Percent)
	Processing ~~RCS/Batch~~	Facilites Managment	Software	Turnkey		
ADP	360	10	-	10	380	5.8
NCR	110	–	100	120	310	4.8
Unisys	–	–	150	80	230	3.5
Citicorp	–	–	–	–	220	3.4
Telerate	210	–	–	–	210	3.3
EDS	40	120	–	40	200	3.1
Chase	200	–	–	–	200	3.1
Control Data	125	–	20	30	175	2.7
IBM	–	–	170	–	170	2.6
Systematics	18	106	11	–	141	2.2
First Data Resources	100	30	–	–	130	2.0
SEI	60	15	40	5	120	1.8
MTech	104	5	6	–	120	1.8
Citicorp Info. Services	3	70	23	–	100	1.5
McDonnel/Douglas	90	–	–	–	90	1.4
Visa Int'l	73	–	–	–	73	1.1
Mellon Bank	50	5	10	5	70	1.1
Mashall Isley	–	–	65	–	65	1.0
Fi Data	30	10	20	–	60	0.8
Kirchman	4	3	45	–	52	0.8
CNB	25	25	–	–	50	0.8
National Data Corp.	35	10	5	–	50	0.8
First Financial	20	25	–	5	50	0.8

EXHIBIT III-1B

MARKET SHARE-SELECTED BANKING/FINANCE VENDORS, 1987 (CONT.)

Vendor	User Expenditures ($M)				Total Revenues ($M)	Total Market Share (Percent)
	RCS/Batch	Facilites Managment	Software	Turnkey		
Master Card	50	–	–	–	50	0.8
Hogan Systems	–	–	10	20	35	0.6
TRW Info. Services	40	–	–	–	40	0.7
First Data Management	15	25	–	–	40	0.6
TRW	40	–	–	–	40	0.6
Computer Assoc (Uccel)	–	–	40	–	40	0.6
Deluxe Printers	5	–	10	20	35	0.5
Data Architects	25	–	5	–	30	0.5
American Mgmnt. Systems	–	–	26	–	26	0.4
Cullinet	–	–	22	–	22	0.3
Stockholder Systems	–	–	14	–	14	0.2
Subtotal	1832	459	826	315	3647	–
(Percent)	56	41	60	43	–	56.1
All Other Vendors	1424	672	550	421	306	–
(Percent)	44	59	40	57	–	47
Industry Totals	3,256	1,131	1,376	741	6,504	100

ADP Comtrend provides an on-line service for futures trading related to commodities, currencies, and interest rates.

60,000 ADP quotation terminals and 7,000 micro-based quotation workstations are now installed.

b. Company Strategy

After adding revenues from all products and services, ADP is shown to have the industry's largest market share.

The 36-year-old company has shown consistent growth of over 10% annually since 1961. Payroll and accounting services account for over 50% of revenues.

ADP growth includes continuing acquisition activity.

- ADP acquired the brokerage transaction services division of Control Data Corporation.
- ADP took over payroll and accounting services from Computer Sciences Corporation and Security Pacific Bank in recent years.
- ADP expanded its ATM network into Illinois and New England by purchasing two ATM companies.
- A major provider of back-office processing services, ADP has moved into the front office with its acquisitions of GTE Quotation Services and Bunker Ramo Information Services.

By becoming a reseller of Digital Equipment Corporation's VAX/MICROVAX systems and IBM's PC hardware, ADP has been able to forestall loss of revenue from declines in on-site processing.

c. Recent Activities

ADP's Trend Setter system uses Convergent Technologies' desktop computers to receive stock market quotes and news via satellite. Over 200 banks and brokerages in the U.S. and Europe use the system.

The acquisition of Instanteller, a proprietary shared ATM network located in California, is likely to make ADP's Electronic Finances Division (EFS) the largest independent U.S. provider of ATM services.

- The EFS Division was profitable in 1986 and 1987.

d. Future Direction

Although ADP's back-office brokerage services business has grown slowly, the stock market volume should give it a needed boost, notwithstanding the events of October 1987.

ADP in January 1987 announced agreements with Merrill Lynch and Shearson Lehman to develop a customized quotation system. First deliveries are expected in 1988.

ADP has also targeted a national ATM network as one of its basic services to the industry.

Remote processing will continue to be a major service product offered to smaller financial institutions.

2. Chase Manhattan

a. Products and Services

Chase provides processing services to other commercial banks. Applications are for retail and corporate customer services and bank administration.

Chase, through its subsidiary Power, Inc., provides processing services to mortgage bankers.

Through its IDC subsidiary, Chase provides on-line data base services to the Federal Reserve for interest rate and money market aggregate economic analysis and forecasting.

- Chase also provides on-line data base services for company evaluation, interest, and foreign exchange rate forecasting, and merger and acquisition analysis.

b. Banking and Finance Sector Industry Markets

With the recent acquisition of savings and loan bank services, Chase participates in all market segments.

c. Company Strategy

As a money center bank, Chase has been restricted by banking regulations. It has not been allowed to participate in regional banking pacts.

- Chase, like Citicorp, is avoiding the restriction by acquiring S&Ls in other states and converting them to commercial banks.

- Chase plans to acquire banks in states that allow nationwide banking, such as Arizona.

Chase is also developing its investment bank services, for example:

- Mergers and acquisitions.
- European market underwriting.
- Interest rate swaps.

d. Recent Activities

Chase bought nine S&Ls in Ohio and Maryland in 1985. It has reopened them as commercial banks.

Chase has formed a subsidiary, Chase Access Services, to pursue wholesale electronic banking services.

Spectrum has been announced as Chase's home banking and information system.

e. Future Direction

Chase will continue building its on-line data base services for various markets.

Some 25% of revenues may come from investment banking in the future. Investment banking clients—the same customers who have been borrowers of bank loans for years—will present opportunities for new-product development.

3. Citicorp: Citicorp Information Resources (CIR)

CIR is a subsidiary of Citicorp and provides national remote processing, application software, and facilities management services to financial institutions.

a. Products and Services

Galaxy 2000 credit union system.

National Standard System - an on-line integrated set of financial applications software, offered as on-line processing services.

- On-line demand deposit.
- Share draft accounting.
- Dealer floor plan system.
- On-line customer profitability analysis.

- On-line general ledger.
- On-line commercial loans.
- On-line financial management.
- On-line asset/liability management.
- On-line savings system.
- On-line certificates of deposit.
- On-line account reconciliation.
- Mortgage loans
- Marketing model.
- On-line installment loans.
- Customer information file

Comprehensive Banking System (CBS), an integrated real-time system running on IBM System 38s. There are 70 banks installed worldwide.

- The Quadstar is a PC-based EFT terminal, for smaller banks.

- CIR's 10 data centers provide processing services to 1,300 clients at 2,300 locations in 43 states; over 2.7 million transactions are processed daily.

b. Banking and Finance Sector Industry Markets

CIR serves all four market segments. Primary targets are banks, thrifts, and credit unions.

c. Company Strategy

Money center banks such as Citicorp and Bank of America view S&Ls as an entree to nationwide banking. Active in S&L acquisitions, Citicorp obtained a 60-branch S&L network in Illinois and a 34-branch S&L institution in Florida to add to its 92-branch Citicorp Savings of California.

CIR has acquired nine processing services companies during the 1980s. The most recent purchase was the July 1987 acquisition of the Comprehensive Banking Systems (CBS) software product's staff from the Newtrend Group, Orlando, FL.

CIR is decentralizing its processing operations, having moved check processing to its Delaware-based operation facility and credit card servicing activities to South Dakota, and is building a Nevada-based processing center for handling mortgage operations.

Citicorp's investment in communications technology on a global basis has been over $3 billion over the last five years, an amount exceeding the equity capital of virtually all of the nation's largest banks.

d. Recent Activities

Citicorp's latest entry into home banking is its full-feature FOCUS system, a PC-based money management account that combines checking, overdraft lines, an automatic daily sweep into mutual funds, VISA debit, installment loans, and discount brokerage.

Citicorp's acquisition of Quotron Systems in 1986 placed it as the leader in stock quotation systems.

Citicorp, RCA, and Nynex have formed a partnership for researching and developing interactive services, such as home banking and shopping.

CIR is making a major effort to standardize and update its on-line processing services, and has released three new software products for banks, thrifts, and credit unions.

The Global Communication Network enables Citicorp to become a low-cost provider of international as well as national wholesale financial services. This communications network–which has direct telecommunications ability 24 hours a day, 7 days a week in 140 cities and 85 countries–operates five major nodes under the standard X.25 linkage. Citicorp offers its "Global Report," an electronic news and data service, over this vehicle.

e. Future Direction

Citicorp clearly intends to be a major provider of on-line international financial services.

In addition to wholesale services, Citicorp will expand consumer electronic banking services internationally. ATMs are already available for access in Hong Kong and Europe.

Citicorp's financial strength allows it to expand into additional market areas through acquisitions, as it has done through purchase of savings and loan groups, and Quotron.

4. Quotron (Division of Citicorp)

a. Products and Services

The bulk of current revenues is derived from the sale of service and software to brokerage firms and financial institutions. Quotron is expanding its service offerings to encompass personal financial computing and financial office automation.

- Financial inquiry services are offered to trust departments.
- Financial information services are offered to corporate banking divisions.
- Inquiry and financial information services are offered to the investment management division.
- Financial inquiry and information services are offered as part of discount brokerage operations.

Quotron Systems provides stock quotation services to investment managers.

Quotron Systems supplies a comprehensive on-line securities and commodities quotation service to national brokerage houses such as Merrill Lynch, as well as to regional and local firms.

b. Banking and Finance Sector Industry Markets

Quotron provides services to all segments except the savings and loan segment.

c. Company Strategy

Quotron commands some 70% of the electronic stock quotation and online financial information services market.

Quotron achieved its mastery of the market by concentrating on this one niche and developing its own advanced terminal.

Quotron hopes to maintain its lead by staying ahead of larger competitors technologically, and by knowing its market in greater depth than newcomers can.

d. Recent Activities

Quotron is expanding its product and service offerings into a personal financial workstation with the ability to handle financial computation, word processing, electronic mail, and other office automation functions. The Q1000 replaces the Q800 and is based on the Motorola 68000 microprocessor.

e. Future Direction

Quotron finds itself in an increasingly competitive market as large banks, brokerages, and IS vendors find the opportunities attractive. Quotron's acquisition by Citicorp will inhibit Quotron's ability to penetrate other financial organizations that may regard Citicorp as a competitor.

5. Computer Associates (UCCEL)

a. Products and Services

UCCEL, now a subsidiary of Computer Associates, offers mainframe-oriented banking applications software through its Financial Systems Division. More than 600 systems are installed, delivering application software for deposits processing, loan processing, general accounting, transaction processing, decision support, and customer information management.

b. Banking and Finance Sector Industry Markets

UCCEL is active in the banking and S&L sectors.

c. Current Activities

UCCEL's recent acquisition by Computer Associates forms a dominant software vendor, very powerful and well positioned in a number of target markets.

UCCEL has withdrawn its Infoloan, its fully integrated loan package, from beta test. Indications are that a one-year delay in delivery of this software may be anticipated, due to development problems. More than forty banks have contracted for Infoloans, and the delay may harm UCCEL's market position in the near term.

Two fast-selling products introduced in 1986 are the deposit software and profitability modules.

d. Company Strategy

UCCEL is gearing up for an anticipated growing demand for large-scale bank systems. UCCEL is spending almost $9 million dollars in 1987 for banking product development.

- UCCEL has set up fee-based consulting services to assist clients with installation.

e. Future Direction

UCCEL is increasing its attention to S&L institutions, without losing its focus on large banks.

UCCEL expects to achieve further financial software integration of its products and to produce better management tools for bankers. The Enterprise Management system and Transaction Management Systems are representative of such broadly integrated products.

6. Control Data Corporation (CDC)

a. Products and Services

CDC provides a wide variety of information services to commercial banks, including:

- Commercial loans, demand deposits, customer information files, savings, time deposits, installment loans, real estate, ATMs.

- Payroll and other automated business services on a private-label basis.

- Funds management, lock boxes, and other remote processing for corporate banking.

- The Cybercredit II debt collection system, marketed to financial and retail organizations as a turnkey system or software package.

- On-line data base services including more than 35 economic analyses, merger and acquisition prospects, and money market operations.

- EFT Data Services Division, in Greenwich, CT, provides payment authorization services to commercial banks, which in turn market the service to retail merchants.

CDC, through its Business Information Services (BIS) group, provides a wide array of services to S&Ls, including:

- Remote processing services for S&L financial planning.
- On-line data base services for financial analysis and mergers/acquisitions.
- Integrated systems for dealer floor planning.

CDC offers information services in two areas to other financial institutions:

- Processing services and integrated systems to credit unions; there are 1,500 processing services customers and 100 in-house system users.

- Processing services to finance companies through its Action Data Services group. More than 115 companies with 1,800 offices utilize the service.

b. Banking and Finance Sector Industry Markets

CDC provides processing services to all financial segments except security and commodity organizations.

CDC also provides limited hardware, software, and integrated systems to selected markets (credit unions, banks).

c. Company Strategy

Losses from its computer hardware operations are providing incentive for further development of CDC's service business.

Like UNISYS, CDC was a strong contender in the peripherals market, but competition and management problems have caused a decline in the company's market share.

d. Recent Activities

During 1986, CDC strengthened its balance chart by selling parts of its service business, and returned to profitability in early 1987.

CDC signed a $1 million contract, its largest single Credit Union System sale, with the Minneapolis Federal Employees Credit Union.

CDC acquired the California division of Bank of America's DECIMUS Data Service Company, merged into the BIS Group.

"Compete" TM is a fully integrated data base system for midsize banks and holding companies. "Compete" TM runs on IBM System 38s.

e. Future Direction

CDC will undoubtedly focus on the profitable parts of its businesses in order to regain market viability.

Financial services are an area of strength for the company and should exploited.

A well-capitalized partner would brighten the company's future.

7. EDS

a. Products and Services

EDS–a major provider of facilities management and remote processing services to over 600 commercial banks–also supplies integrated systems to community banks using the IBM System 36. EDS recently introduced "Enhance" TM, an integrated bank data-processing system offered nationwide through EDS-NET.

EDS services over 50 S&Ls, either directly by FM or emanating from FM data centers. EDS also provides integrated systems for S&L operation, utilizing the IBM System 36 and more recently their Centurion computers.

EDS is a major provider of information services to credit unions. Services include:

- Facilities management for the national association of over 2,000 credit unions.

- Processing services for another 1,100 credit unions. Together these credit unions total 10 million members.

- Integrated systems using Centurion micro systems.

"Trade Pro" TM is a multicurrency securities trading system.

b. Banking and Finance Sector Markets

EDS participates in all segments.

c. Company Strategy

EDS became a subsidiary of General Motors in October 1984 at a cost of $2.5 billion, but still retains its corporate identity.

GM's plans for EDS include retaining and expanding its traditional business while offering new services such as funds transfer.

GMAC's plans to enter home mortgage banking may also depend on EDS expertise.

In a significant move, EDS signed agreements with BANC ONE of Columbus, Ohio, and Norwest of Minneapolis to develop a major retail bank processing system for financial institutions of $1 billion or more in assets. A product is expected in 1989.

EDS is conducting a pilot project for corporate funds transfer between GM and its suppliers. The project involves First Chicago and seven other banks.

GM acquired an extensive satellite network when it bought Hughes Aircraft Company in 1985. This telecommunications system [illegible] permit EDS to pioneer new financial service markets.

d. Recent Activities

EDS acquired the rights to Anacomp's retail banking package.

In a plan to bolster its implementation capability, Hogan Software has made a joint agreement with EDS to implement Hogan's banking software for current EDS and other clients.

In late 1986 EDS acquired the Pagedata Division of National Data Corp, which provides remote computing services for banking, financial planning, and investment functions.

EDS also has a joint agreement with Cullinet for implementing Cullinet DBMS software for banking clients.

e. Future Direction

GM has other plans for EDS outside banking and finance. These plans run the risk of spreading the company too thin.

EDS is also having to adjust to GM's different contracting systems and to train some 10,000 GM transfers.

EDS' ability to juggle all of its new assignments with its traditional business and the degree of support provided by GM will determine its success.

EDS' agreements with BANC ONE and Norwest testify to its commitment to the financial industry.

8. Hogan Systems

a. Products and Services

Integrated financial applications software for money centers and regional institutions with assets in excess of $750 million.

Transactional Money Management Systems.

Software for community banks.

Revenues from financial institutions reached $44 million in 1987.

b. Banking and Finance Sector Industry Markets

Hogan is active in servicing community and global bank markets, savings and loans and credit unions.

c. Company Strategy

Hogan had executed a well-publicized agreement for IBM exclusively to market its banking software package in the U.S. and Canada. This has ensured Hogan Systems of a continuing revenue stream from IBM (perhaps as much as $1 million per month) for the near future.

Hogan has renewed its emphasis on installation and ongoing support as sources of revenue and customer satisfaction.

d. Recent Activities

Acquired Systems 4 of Durango, Colorado, a vendor of community bank software.

Acquired GDK Systems of New York. GDK markets International Money Management Systems.

Completed a three-phase enhancement program for the company's Integrated Loans Program, which covers consumer, commercial, and mortgage loans.

A $10 million development project with Midland Bank, U.K. to develop a system for "megabank" use has been dropped, as Midland Bank pulled out in September 1987.

Larry McTavish, the chairman who was credited by many for improving Hogan's fortunes, left the company in July, 1987.

e. Future Directions

9. IBM

a. Products and Services

IBM provides item and transaction processing software for its check-processing and retail financial terminals directly to banks of all sizes.

IBM signed an agreement in 1986 to be the exclusive distributor of Hogan Systems software in the U.S. Hogan Software is installed in over 140 sites. Hogan's sales in 1987 are estimated at $44 million, and IBM-generated revenue will be very significant to Hogan in 1988 and 1989.

IBM supplies item and transaction processing software to the Federal Reserve and Federal Home Loan Banks.

IBM provides software products to S&Ls for item and transaction processing.

- Very large S&Ls accomplish their own NOW account processing.
- Transaction processing involves branch and floor financial terminal operation.

b. Banking and Finance Sector Industry Markets

IBM is active in all segments now that it has joint ventures in the securities and commodities field.

c. Company Strategy

Although IBM does not dominate banking and finance, it has a substantial installed base of hardware in financial institutions, especially in large commercial banks.

- The dominance of IBM PCs as low-cost brokerage and treasury workstations or for other personal computing use in banks gives IBM a decided advantage.

- IBM has the capacity to increase its financial services market share dramatically.

- IBM is actively building its telecommunications networks, even though it sold its Satellite Business Systems to MCI.

- IBM will emphasize SAA as the development protocol for future, integrated systems.

- On the telecommunications equipment end, IBM, by virtue of its Rolm subsidiary, is one of the nation's largest suppliers.

d. Recent Activities

IBM, in a joint venture with Merrill Lynch and McGraw-Hill, is launching IMNET to provide a national quotation and trading service to brokerage houses and individual investors. Transmission to the individual investor in the home will be via unused capacity of the Public Broadcasting System (PBS).

IBM and Merrill Lynch have combined to offer stock quotation services utilizing the IBM PC with software supplied by Monchik-Weber. Such a service, delivered through a satellite communications network, is likely to alter and expand the market for delivery of information services to security and commodity firms.

IBM has selected three financial software products as a part of its Cooperative Marketing Program; these products will be offered as a part of IBM's own hardware and software marketing efforts.

- Kirchman's Direction 1000 software is targeted for small, independent, community banks.
- Shared Financial Systems' ON/2 is a series of EFT message-switching modules.
- MTech's Action 2000 is a list of transaction-processing software.

e. Future Direction

IBM appears to be concentrating on the delivery of services and software rather than development of its own applications software. However, the recent formation of the IBM Application Software Division, with its 6000 employees and a mission to penetrate selected vertical markets, is a potential threat.

IBM is pushing SAA as its development architecture of the future, and trying to get as many vendors as possible to embrace SAA, offsetting DEC's competitive advantage.

In recent years IBM has shown an interest in working with outside software suppliers, such as Hogan Systems.

More joint ventures, perhaps some strategic partnering with large financial institutions, could be attractive to IBM.

The IBM pattern of "wait and see how the industry develops" will apply in this case.

10. MTECH

a. Products and Services

MTECH is a leading provider of remote interactive processing to over 1,400 banks and thrifts located in 11 states.

- Financial accounting.
- Customer information file.
- Audit controls.
- Commercial/personal loan system.
- Deposit system.

MPACT operates the nation's largest shared ATM systems, with over 1,200 ATMs installed in 542 financial institutions.

MPACT EXPRESS is a point-of-sale (POS) program serving 165 retailers using 10,000 POS terminals. Exxon and Mobil are significant participants in this network.

The Action 2000 Credit Card System is complementary to MPACT EXPRESS..

MTECH offers microcomputer software to the banking and finance industry. Downloading of information from the MTECH mainframe to a microcomputer in the client bank is facilitated by the MIS-ON-A-MICRO software.

b. Banking and Finance Sector Industry Markets

M-Tech is active in banking, and savings and loan sectors.

c. Company Strategy

Maintain product investments to keep a leadership role in state-of-the-art technology deliveries to clients.

- Expand ATM/POS network through acquisition and partnering arrangements.
- Increase market share in existing markets; expand geographically to new markets.
- Become the lowest-cost provider of data processing services to financial institutions.

d. Recent Activities

Acquired Kalvar, a Minneapolis-based COM firm.

Raised $87 million through the issuance of debentures.

MTECH teamed with UCCEL to win a $27 million contract for information processing from National Bancshares Corp of Texas.

e. Future Directions

MTECH will continue its efforts to reach larger banks and desires to expand beyond its traditional midrange client base.

MTECH will continue to look for acquisitions in the banking and finance area.

MTECH is well-positioned to maintain and expand its strong market position in the financial industry.

11. NCR

a. Products and Services

NCR, specializing in integrated systems for small community banks, also supplies software products for retail processing in conjunction with its hardware offerings to medium-sized banks. Banker 80, an NCR software package, is installed in more than 1,000 sites worldwide.

NCR is a leading vendor in the S&L marketplace.

- Remote processing is provided to over 500 S&Ls through nine regional centers, a part of NCR Data Services. NCR will also offer its Starcom II as a software package. Starcom II includes 4GL and relates data base management information and accounting system.

- NCR supplies integrated systems to smaller S&Ls.

- Software products are provided to larger S&Ls that utilize NCR mainframes.

NCR provides integrated systems to credit unions, and delivers software products designed for NCR processors to finance companies and credit unions.

NCR is a leading supplier of ATM, POS, and bank teller terminals.

b. Banking and Finance Sector Industry Markets

NCR is active in all market segments except securities and commodities.

c. Company Strategy

NCR is concentrating on transaction processing and funds transfer using NCR hardware. Sales of such equipment represents about 25% of NCR's revenues.

Although NCR now concentrates on small systems and no longer develops large mainframes, it recently introduced some midsize machines for electronic funds transfer and credit checks. Such machines can be enhanced when needed and offer "fault tolerance," a design that permits nonstop processing even if part of the system fails.

NCR is working with software companies to provide transaction-processing application packages and to upgrade older NCR software.

d. Recent Activities

NCR Data Services Company has acquired the Bank Services Division of Anacomp. ATM/POS financial transactions support is provided through its affiliation with Universal Money Centers, in which NCR holds a minority interest.

The new NCR 9800 series of machines, introduced in early 1986, can handle 26 transactions per second, and operate in a "nonstop" processing mode. These systems can be an integral part of OLTP and EFT networks.

NCR is counting on its new Universal Financial System (UFS), developed over 7 years at a cost of $15 million, to strengthen its position in large banks. NCR hopes that 80% of the users of its older CIF and Class software users will migrate to UFS. About 550 current NCR clients use CIF and Class. UFS is aimed at banks and thrifts with assets from $250 million to $3 billion.

e. Future Direction

Although NCR will sell first to its existing customers, it plans to challenge Tandem and IBM in high-end transaction processing in the future.

NCR will attempt to tie together its transaction processing and real-time fault tolerant systems with retail POS and banking ATMs.

12. Systematics

a. Products and Services

Systematics is dedicated to data processing services and software for regional banks, typically those with less than $1 billion in assets, but is moving into services or software sales to larger banks.

Facilities Management was Systematics' initial market entry into "back office" processing. Seventy percent of revenues are generated by FM contracts, generating 25% margins.

More than 700 banks and thrifts use Systematics FM services.

Software licensing now generates 11% of revenues, with gross margins of 50%.

Remote computer services are offered to complement FM.

Turnkey systems on IBM System 36 and 4300 computers are also available.

b. Banking and Finance Sector Industry Markets

Systematics focuses on the banking and savings and loan market segments.

c. Company Strategy

Systematics keeps close control over its own destiny by producing its own software, which is used in its clients' FM operations.

Systematics will spend $65 million on product development during the next five years, keeping its competitive edge by adjusting to changing conditions.

d. Recent Activities

Systematics sold its accounting software package to $7.2-billion-asset Michigan National Bank, a step up in customer size.

The "transaction system" is an on-line delivery platform that integrates teller, platform, and ATM devices.

Matrix Management, a Dallas-based consulting firm, was acquired by Systematics to provide installation planning and consulting services.

e. Future Direction

Relational data base products are being planned by Systematics.

Systematics will continue to channel its resources in the area it knows best– "back-office" banking applications, supplemented by high-quality professional support services.

13. Telerate

a. Products and Services

Telerate supplies national and international financial information services in an on-line environment. The information includes interest rates, exchange rates, financial commentary, and major announcements in financial markets. Approximately 50% of Telerate's revenue comes from the banking and securities industry. Industry revenues for 1986 are estimated at $45 million. Over 42,000 terminals on subscribers' premises worldwide access this service.

Telerate provides financial information services to investment management companies.

b. Banking and Finance Sector Industry Markets

Telerate provides its on-line services to all segments.

c. Recent Activity

Telerate acquired Compu Trac in 1985. Compu Trac provides pricing analysis of stocks, stock futures, and related market items. Telerate subsequently announced Tele-trac, as a graphics interface to the data delivered by Telerate.

Telerate acquired CMQ communications, a Toronto-based provider of real times quotation services in Toronto, Canada, for $75 million.

Telerate and AT&T are forming a joint venture to offer foreign exchange transaction services, in competition with an existing service of Reuters Holdings PLC.

Telerate and Lotus have founded a joint development project. Lotus will provide analytical software based on its spreadsheet technology, and Telerate will produce a data feed to be combined with Lotus software for financial analysis and modeling.

d. Company Strategy

Like Quotron in security trading, Telerate specializes in one type of service, but is increasingly broadening its coverage in this niche.

Telerate introduced Broadcast services, enabling subscribers to receive selected data via satellite on personal computers.

International expansion is an important part of Telerate's growth.

e. Future Direction

Telerate is in an enviable position because its base of customers is fast growing. More institutions, and many outside the industry, have need of its special information.

Telerate faces the possibility of eventual takeover activity from large banks or other IS providers.

Telerate's revenues increased by 42% in 1986 and earnings increased by 21%. Telerate has a strong financial position.

14. UNISYS (Burroughs and Sperry, 1986 Merger)

a. Products and Services

In competition with NCR, UNISYS offers integrated systems to small independent banks and software products to support its distributed processors in medium- to large-sized banks. Most of these products were part of the Burroughs Corp. prior to the Sperry purchase and merger.

UNISYS Corporation offers integrated systems to credit unions and item processing software packages to the Federal Reserve for check clearance.

UNISYS offers integrated systems to smaller S&Ls and a full line of software products for S&L processing on UNISYS mainframes.

UNISYS has a strong presence in international banking from its installed base of "SWIFT" users.

b. Banking and Finance Sector Industry Markets

UNISYS participates in all of the segments except securities and commodities.

The company provides applications software, hardware, and integrated systems to its customers but does not offer processing services.

c. Company Strategy

UNISYS is striving to become more service and software oriented, although it retains its hardware focus.

Hardware products have expanded to include new office automation software, intelligent workstations, and communications networks.

UNISYS mainframes, for example the A-15 processor, still provide a strong anchor for the rest of the company, and the A-3 and A-9–newer, small- and medium-sized machines–have been well accepted by the company's traditional customers. Most recently, the smallframe series–A-1, A-4, and A-6–were introduced, as a response to IBM's 9370.

The B-25 multiuser computer workstation competes favorably against the IBM/AT in price and performance. UNISYS manufactures the B-25 internally but distributes the product through dealers. Its network is being expanded to some 450 dealers.

d. Recent Activities

UNISYS obtained a $50 million branch automation contract for the $92-million-asset Hong Kong and Shanghai Bank.

UNISYS has used its own Linc 4GL to write and create an international banking package, the Gold Wholesale Banking system.

e. Future Direction

UNISYS will continue to market primarily to its existing customer base, especially in banks and financial institutions.

Products will be sold as integrated solutions rather than single items; for example, workstations for a work group rather than personal computers. For success, UNISYS will seek to improve its telecommunications technology and its range of applications software.

C
Significant Competitive Activity by Additional Vendors

1. Financial Institutions

The number of credit card processing associations has been reduced to four following the acquisition of Computer Communications of America by the National Bank of Detroit. At least two of the remaining four associations including National Data Corporation (NDC), have held negotiations with other processing vendors.

NDC is in a joint venture with Barnett Banks, an $11 billion holding company, to market CENTRICS, a treasury workstation utilizing the IBM PC. The treasury workstation allows different managers to interact with Barnett Banks for cash management, money transfer, ACH, and account reconciliation.

Mellon Bank provides retail correspondent processing services to over 300 banks in 16 states from Vermont to Arizona through its Data Center Services Division. Mellon Bank recently acquired the correspondent data processing services of the Bank of Boston, and Data-Link, a software and services company. Mellon provides ATM services through operating CASHSTREAM, a shared local network interfacing with the CIRRUS national network.

VISA has assumed management of Interlink, the largest POS network for stores and restaurants.

Even though VISA and Mastercard are owned by many of the same banks, they are competing with each other for market share and presence.

Bank of America provides an extensive array of automated business services, particularly payroll. Recent acquisition of Managistics from Chase extends coverage from California through Chicago to the East Coast.

In order to retain greater control over electronic transactions, a consortium of 42 primarily very large banks sponsored the development of two shared ATM networks—CIRRUS and PLUS. The CIRRUS network interconnects over 14,000 ATMs in 44 states. The PLUS network has somewhat fewer ATMs, but about equal national coverage. Consolidation is occurring here also, as VISA acquired a 1/3 ownership of PLUS and its 13,000 ATM network.

Mastercard and CIRRUS have discussed a merger, which would form, if implemented, the largest ATM network in the U.S.

First Interstate Bank Corporation is standardizing the delivery of its technology-based retail banking products throughout the banks of its 13-state holding company and affiliates. First Interstate was a leader and founding partner of the Cirrus network. Its Teller Item Processing System (TIPS) allows customers to have account access in its 13-state network. Its Administrative Branch Communications Systems (ABCS) is used to market a wide variety of product services in the retail marketplace. NOVA, Interstate's POS system, provides credit card and check authorization services to well over 5,000 terminals in 13 states. First Interstate is marketing its electronic services on a franchised basis to banks as far away as Minnesota, Hawaii, and Florida.

Security Pacific Corporation has formed an automation company as a subsidiary to offer total electronic banking to its 400 correspondents and affiliates. Services that the automation company offers are:

- Interactive computing.
- Capital market services.
- Electronic banking.
- Funds transfer, clearance, and back-office notification services.

The establishment of data processing as one of its four main lines of business, which include wholesale banking, retail banking, and other financial services, is seen as giving recognition to Security Pacific's strategy of delivery of national and eventually international financial information services through electronic networks.

National Bank of Detroit (NBD) Corporation is consolidating the back room activities of its 18 affiliates and becoming one of the largest ATM/POS bank card transaction processors in the Midwest.

- NBD processes more than 1.5 million bank card transactions monthly, interconnecting 600 ATMs at over 100 regional financial institutions.
- NBD also serves as the electronic switch that connects its Network One with the Cirrus national ATM network.

Exhibit III-2 lists leading vendors of electronic banking services and their capabilities.

2. Information Services Vendors

Tymnet is processing over 10 million POS transactions monthly for over 28,000 terminals for MasterCard.

Comdata Corporation has found a vertical market niche in providing check guarantee/funds transfer services to the trucking and leisure time industries. Market expansion was achieved through acquisition of INSTACOM, which operates the CASHEX system in supermarkets. By concentrating in highly specific market areas, Comdata has been able to achieve revenue growth exceeding 27% annually over the past five years.

American Management Systems generates roughly $25 million in sales of software to corporate banking and credit management clients. AMS is introducing new products, including installment loan, letter of credit, credit card, and collection packages.

First Data Resources (FDR) has been able to successfully leverage its credit card authorization technology into offering telemarketing, especially television marketing and airline reservations services. Nearly 30% of annual revenues come from services other than credit card processing.

GEISCO and Calwestern Automated Clearing House have dissolved their agreement for GEISCO to handle ACH transactions. GEISCO cited the Federal Reserve Bank's "unique advantages" as an ACH clearing house, making it difficult for a private sector vendor to compete. However, VISA was not deterred from moving into this situation, and signed an agreement with Calwestern ACH to take over processing in September, 1987.

SEI, Inc. has successfully shifted its trust applications software, called the Quantum System, to IBM-compatible mainframes.

National Computer Systems (NCS) has added voice commands to its Trustware software to produce a turnkey system utilizing Texas Instruments' personal computers and Speech Command systems. Voice commands are used to accomplish over 40 types of queries from customer data bases in small- to medium-sized trust departments.

EXHIBIT III-2A

LEADING COMMERCIAL BANK VENDORS OF ELECTRONIC INFORMATION SERVICES

	Mellon National	Bank of Boston Corp.	Mercantile Texas	Irving Bank Corp.	Wachovia Corp.	First Interstate	Banc One	NBD Bancorp
Local AOH Processed (Percent)	90	15	–	–	41 credits 62 debits	28	42	60 orig. traffic 15 rec'd traffic
Data Processing for Correspondent Banks (Number of Institutions)	250	460	480	500	–	65	200	10
Provides Switching Facilities	Y	Y	Y	–	–	Y	Y	Y
Central Information File by Name or Number	Y	Y	N	Y	Y	Y	Y	Y
Automated Back Office for Telecommunication Messages and Wire Transfers	N	Y	–	Y	–	Y	–	Y
On-Line Cash Management Systems	Y	Y	Y	Y	Y	Y	Y	Y
Real-Time/ Microprocessor Cash Management System	N	N	N	N	N	N	N	N

Y =Service Provided N=Service Not Provided Source: Salomon Brothers Inc.

EXHIBIT III-2B

LEADING COMMERCIAL BANK VENDORS OF ELECTRONIC INFORMATION SERVICES (CONT.)

	Mellon National	Bank of Boston Corp.	Mercantile Texas	Irving Bank Corp.	Wachovia Corp.	First Interstate	Banc One	NBD Bancorp
ATM Networks								
• Regional	Cashstream	Monec	MPact	–	Relay	–	Y	Network One
• National	Cirrus	Plus	Cirrus		Cirrus	Cirrus	Y	Cirrus
Average Number of Transactions Per Machine, Per Month, and Number of Card Holders	7,000/ 95,000	8,000/ 400,000	7,000/ 1,500,000	–	8,000/ 450,000	7,000/ 4,700,000	–	7,400/ 26,000
Experimental Services	Home Banking; Pilot ATMs in Giant Eagle Supermarkets	ATMs in Supermarkets	ATMs in Supermarkets	–	Video-financial Services	Home Banking; NOVA	Video-financial Services; ATMS in POS Program	Proprietary Home Banking Pilot and POS Large Retailers

Y =Service Provided N=Service Not Provided Source: Salomon Brothers Inc.

Software Alliance, a division of Teknetron, markets an integrated deposits package, installed in 40 banks with assets over $1 billion each.

Cullinet has expanded its presence in the Banking and Finance marketplace through its acquisition of Bob White Software, Inc. Cullinet has a joint agreement with EDS to implement Cullinet DBMS software for current and future EDS banking FM clients. A recent agreement with American Express Bank will produce an international version of Cullinet's banking system. Cullinet is currently beta-testing a new banking system, scheduled for introduction in 1988.

Syntelligence has developed AI-based loan approval processing systems, now in initial use at Wells Fargo.

3. Commercial Institutions

National companies, nonbank in nature (primarily free of regulation), are seen as applying advanced computer and communications technologies in offering consumer financial services at a cost base considerably lower than can currently be offered by money center banks, let alone regionals and independents.

Perhaps the most significant firm in this category is Sears, Roebuck and Company. Through acquisitions of S&Ls, banks, and brokerages, and with real estate agents added to its existing credit and insurance capability, Sears has transformed itself into a national financial services enterprise.

- Sears' latest offering, its Discover card, will permit a wide array of credit/debit transactions for Sears' evolving services. Sears' recently established Payment Systems Division offers private label credit card services, credit processing, and lockbox services through its national network interconnecting 830 stores in 49 states.

J.C. Penney, through its Credit Services Division, is offering a wide array of financial transaction services to retailers–including oil companies–through its national network interconnecting 1,600 stores.

Not to be outdone, Kroger Company intends to establish a branch banking network in its grocery stores in North and South Carolina. Kroger has implemented store bank branches in Georgia through a joint agreement with Heritage Bank of Atlanta. Safeway stores is another supermarket chain with a pilot ATM program.

Other corporations with a national distribution presence involved in bank-like financial services are Shearson-American Express and Prudential-Bache. Merrill Lynch, originator of the "money management" account, has signaled its intention of entering the banking business through acquisition of a state bank charter in New Jersey.

However, commercial banks and the FED still have firm control of the wholesale marketplace; they control the money supply through clearance, discount, and reserve operations.

IV

Information Systems Department Outlook

IV

Information Systems Department Outlook

A

Driving Forces

Cost pressures intensified by increases in loan loss provisions and turbulent financial market conditions became the major driving force in the market during 1987.

Cost pressures are leading banks to consider mergers, shared operations, or off-loading part of their operational load to processing vendors. Processing vendors are enjoying an expansion of work as a result and are greatly increasing the services that they offer. MTech has added more ATM capability, a COM service bureau, education and training courses, and commercial bank processing services. First Financial Management has also acquired a COM facility and added other new products.

Cost pressures have also intensified the effort by major banks to find new sources of revenues through marketplace expansion or the development of new or enhanced products.

Deregulation by federal and state governments in the banking and finance sector have dramatically affected the competitive environment. Banks would like to see further deregulation, particularly in regard to the Glass Steagel act.

- Money center banks have carried out a number of mergers across as well as within state boundaries and will be involved in more mergers to reduce costs through consolidation of operations, as well as to gain access to new markets.
- One regional bank, First Tennessee, was involved in over 30 mergers in the mid 1980s.
- The emerging superregional banks such as Core States, Midatlantic, and First Wachovia will also be involved in more acquisition and merger activities.

Due to the market entry of new, small financial service institutions (FSIs), particularly savings and loan institutions, the total number of FSIs will not decrease as rapidly as formerly projected.

New technology, primarily in the form of intelligent network services including new approaches to credit card and ATM use (touch screen versus keyboard input and uses of A.I.), will continue to expand distribution channels for banking and financial services. New technology will also provide the opportunity for nontraditional competitors, such as retail organizations, to expand services to the financial services industry.

Deregulation and consolidation have provided the opportunity for banks to attempt to improve productivity through economies of scale.

Money center banks must continue to grow in size to economically provide a full range of services to commercial and individual customers through:

- Efficient interfaces to major money transfer systems.
- Extensive branch office network links to national ATM networks.
- Large-scale processing capabilities for check clearance, loan handling, and other processing functions.
- Integrated information networks to support business offices and bank clients.
- Services that offer nationwide, and in some cases worldwide, "market presence."
- Up-to-the-minute information on worldwide lending, currency, and investment markets.

A number of large banks have or are attempting to leverage their size, resources, and market knowledge to gain market share in certain product areas through the use of new technology.

- Chase dominates ACH origination through this strategy.
- Citibank, Bank America, Chase, and First of Chicago dominate bank card insurance.
- Bank of New York has become a significant player in many areas of security processing.

Some industry observers feel that the combination of asset size and the use of technology will result in the domination of the industry by large institutions, those that can afford to buy the most effective systems.

However, the creation of competitive large-scale capabilities by a group of major banks to serve clients has created a situation of overcapacity where individual banks may find that they cannot run their systems with sufficient volume to create peak efficiency.

Banks below the top 10 in asset size have also demonstrated the ability to use technology profitably. The check-clearing services of First Tennessee and National Bank of Detroit illustrate this.

A few large banks may be able to concentrate their attention on segments of work (e.g., Bankers Trust on corporate banking and Continental Illinois on Merchant Banking), but most large banks will continue to provide a broad mix of services to both retail and corporate clients.

Large banks and other financial institutions will also have to pay more attention to their markets. Their ability to sell to chosen markets may become limited by customer and demographic bases.

Exhibit IV-1 summarizes the major driving forces affecting the Banking and Finance sector.

B

Issues and Objectives

There is pressure to upgrade and integrate software faster due to product changes, competition, and deregulation, which causes a need for faster development methods and more flexible software.

- Bank services are changing and increasing so rapidly that the professional services capabilities, application packages, processing capabilities, and in many cases, product knowledge of vendors must be called on for assistance.

- Many bank systems are old and do not account for the need for customer-oriented versus function-oriented data bases.

The continuing growth of ATM and POS use, interbank EFT systems, and on-line applications has made communications one of the key areas of change affecting this sector's IS departments.

- The growing demand for electronic information delivery is affecting many industries.

- Banks have to be prepared to supply electronic information to a group of offices at client corporations, as well as to link corporations for such purposes as trade payments.

- Individuals now receive electronic information on payments, account details, and investment opportunities from banks.

EXHIBIT IV-1

BANKING AND FINANCE DRIVING FORCES

- Loan Portfolio Risk
- Cost Reduction
- Merger and Acquisition
- Product Opportunities
- Use of Technology/Conversion from Paper
- Deregulation

Major banks are planning to expand and upgrade information service capabilities that are customer-oriented.

- A greater use of user-friendly interfaces–such as the Citibank ATM display and the use of AI in interface systems–has been explored in 1987.
- Improved CIF capabilities are being introduced in retail and wholesale banking; banks and other FSIs are intensifying efforts to locate and sell prospects.
- Systems development has been focused on an application (i.e., product) basis. Because of this structure, banks have a difficult time associating a customer with the services the banks perform. Banks are also having difficulty developing prospects for services from their current customer base. Steps are underway to orient business more toward customer relations.

Developing an architecture that offers an integration and improvement of customer services is a major undertaking. The key will be to obtain and relate information from separate data bases. This task could involve restructuring most systems in the organization. The institutions that are considering or undertaking this task are planning for up to five years to achieve their goal, with expenditures that may exceed $1 billion. Each bank must consider its needs and situation in developing an architecture.

- Core States developed a plan that allowed migration toward an integrated base through a gradual upgrade of applications.

- First Tennessee developed a plan that relates customer accounts in two ways, for operational or marketing needs.

The need to reduce costs or expand processing to gain economies of scale or expand revenue has benefited from deregulation and the eroding barriers of interstate banking. This has accelerated the rate of bank mergers and acquisitions, which has led to consolidation of IS departments and the development of information service companies in multibank holding companies.

- Systems compatibility has become a major issue. As different banks begin using a single consolidated source for information services, the migration to compatible computing systems becomes paramount if the efficiencies inherent in the consolidation are to be realized.

- A number of banks now find themselves with two, three, four, or even five manufacturers of computing systems. The cost of IS per asset dollar can be considerably higher in these institutions.

- Some consolidations of financial institutions are only occurring at the data center level. Systems development and maintenance still remain in the individual banks. Ultimately, the institutions that are merging are planning to consolidate the systems development group also, but this is a longer term and more complex goal.

As more information is stored and processed, the need for internal and external data security increases dramatically. Consumer protection laws provide strong incentives for financial institutions to control the dissemination of financial information.

Even though the banking and finance sector is continuing to exhibit the most technological opportunity (and disruption) of any sector, the top IS objective is still cost containment.

- Increased competitive pressures have mandated cost containment strategies for administrative systems.

- Bank profitability continues to be under severe pressure due to poor loan performance. Management is trying to reduce costs to keep its equity position high enough to prevent regulatory intervention.

Banking management is in a dilemma regarding information systems.

- It must invest heavily in new systems and technologies to meet the competitive threat of other financial institutions, insurance companies, and nontraditional competitors such as retailers.
- But if business doesn't increase, banks may find themselves burdened with overcapacity.
- Poor loan performance means that costs must be controlled to maintain acceptable profitability.

Some banks may find that the only solution is to share production or use third party processors in cases where economies of scale dictate a heavy use of technology but competition may prevent business from expanding to fill the capacity.

To gain maximum leverage of marketing efforts, financial service organizations must keep the customers they worked so hard to sign. MIS must work closer with senior management to obtain and analyze necessary account information and find the appropriate products or services for the organization's customer base. Information in the financial services business can no longer be seen as a competitive advantage; it is a necessity.

Deregulation, new products, and the need for more integration has led to a growing application backlog. While all applications may not be of equal importance, the sheer number of unmet application requests must be dealt with. Shorter development cycles, the use of application software packages, and outside services must be considered.

Exhibit IV-2 and IV-3 summarize the top issues and objectives in priority order for this sector.

C

Management Perception and Organizational Issues

Most banks view IS as a corporate asset. However, upper management is beginning to question the growth of expenses in relation to earnings.

- Senior management has a strategic view of IS as a key competitive tool and a major component of new services. Cost pressures have forced senior management to review IS plans to a greater extent, however.
- Middle management may see IS as an expense they cannot control if they have not realized increased revenue from IS-based services.

IS reporting to bank management has focused on two major factors.

EXHIBIT IV-2

BANKING AND FINANCE ISSUES

- New Services or Product Requirements, Particularly for New Revenue Opportunities, can not be Met Rapidly Enough
- Need for an Integrated Information Architecture
- Growing Demand for Electronic Information Delivery Systems
- Merger and Acquisition Activity that Favors Consolidation of Data Centers, Software, and IS Staff within the Affected Institutions
- The Creation of Overcapacity in a Desire to Upgrade Systems
- Possible Decrease of Costs through a Shift of Work to External or Shared Processing Facilities
- Growing Importance of Computer System Security

- Meeting budget constraints and keeping spending levels comparable with key competitors.

- Return on investment and cost benefit analysis for recommended activities. The use of post-implementation analysis is still rare. It appears that once a project is approved, it will be implemented and remain in operation until someone can convince management it should be replaced. This must change—the post-implementation analysis is vital to the success of the product and the profitability of new services.

- Some institutions view IS as so essential to business that no measurement of total costs or benefits is made. This is a two-edged sword.

EXHIBIT IV-3

BANKING AND FINANCE OBJECTIVES

- Cost Containment
- Handle Expanding or Changing System Requirements for Products more Rapidly
- Improve Information Delivery within Institutions and to Customers
- Respond to Regulatory Requirements

- This situation does not sufficiently encourage the IS department to evaluate opportunities to lower costs and improve productivity.
- This situation does not encourage IS to sell itself to management. Even if management does not require cost-benefit analyses, IS should convince users and management that its expenses are worthwhile.

The status of IS has increased steadily in the last five years in responding institutions. The head of IS now has a higher title, such as senior or executive vice president, and reports to the president, vice chairperson, or executive vice president. IS has moved away from reporting to the financial segment of the organization and is being viewed as an operating and, in some cases, a profit center. More IS executives have moved to the top levels of bank management as well.

IS is becoming an equal participant in the strategic process and has taken on an increasing role in product development. The role of IS in this period will be to improve information delivery in general.

Respondents believe information systems can become a competitive weapon in this sector by:

- Implementing systems that increase an institution's ability to gain market share of deposit, loan payment, investment, or other products.

- Reaching more customers in more effective ways through electronic delivery of information.
  - On treasury workstations.
  - Through ATMs and credit cards with new features.
  - Through EDI systems for transferring payments.
- Developing flexible systems that improve the institution's ability to react to outside influences (e.g., competition and deregulation).

D

Impact of Technology

End-user computing is having an increasing impact on this sector, although many respondents are marshalling resources to support personal computers rather than end-user computing in general.

Departmental processing is being implemented in larger banks to serve application needs as well as OA. Systems to plan customer strategies and contact schedules, as well as to handle products, are being implemented in user areas. The current focus of developing a central systems architecture is deferring action toward departmental systems in many mid-sized and smaller institutions.

Connectivity has become of great importance in this sector due to system integration needs of users. Diverse hardware and software need to be integrated to gain maximum use of installed equipment and to facilitate the exchange of information and ideas in the organization.

Relational data bases on mainframes have begun to be installed in the top 50 banks. DB2 use has grown rapidly.

Voice and data integration is believed to have medium impact on this sector. Electronic information delivery is vital to the success of banks and financial institutions. The cost of networks is a key concern, and respondents believe that merging voice and data networks is a means of reducing costs; however, recent trends indicate implementation has not been widespread.

LANs have been used in the top 50 and some smaller banks to link functional areas or those concerned with certain processing systems. The lack of LAN standards has been a problem in this regard.

Optical storage (CD-ROM) has only been considered in an experimental way, but its usage for information storage will grow in 1988.

Exhibit IV-4 summarizes the impact of the above technologies on the banking and finance sector.

EXHIBIT IV-4

BANKING AND FINANCE IMPACT OF TECNOLOGY

	IMPACT	COMMENTS
End-User Computing	Medium	Growing in larger banks
Departmental Processing	Medium	Applications and OA are now being done on departmental computing systems in large banks
Connectivity	High	Connectivity required to serve marketing, contact and planning needs
Relational Data Bases	Low	Larger banks are interested
Voice/Data Integration	Medium	While viewed as important, connectivity outranks voice/data integration needs.
LANs	Medium	Usage has grown
CD ROM	Low	Will be introduced for storage of data for occasional retrieval
Use of AI	Low	Will be introduced in credit and investment evaluation and in ATM interaction

In 1987, banking and finance users' interests in technology centered on means to achieve connectivity and integrate existing systems and data integrity, control, and security. Details are shown Exhibit IV-5. The use of A1 was also receiving interest as a new area of technology, particularly in credit, investment, and ATM applications. Although the use of smart cards was being discussed, this product did not appear to receive much attention despite its potential for off-line card applications.

EXHIBIT IV-5

BANKING AND FINANCE AREAS OF NEW TECHNOLOGY INTEREST

- Connectivity
  - Wide-Area Networks
  - Medium-Area Networks
  - Control of Shared Data
- End-User Computing
  - Interaction with Corporate Data Base through Microcomputers and Distributed Minicomputers
  - Data Integrity
  - Data Security

    Utilization of CASE
- Use of AI in Credit, Investment, and ATM Interfaces

E

New and Changing Applications

New or expanded requirements for international lending, foreign exchange trading, and foreign debt monitoring and restructuring will continue to have an impact on vendor assignments and internal development.

Application software packages and professional service software development work will also continue to show an emphasis upon integration of fundamental banking applications—retail and wholesale deposit, trust management, and international lending.

- The changing economics of delivery services have rendered fundamental systems obsolete. Many of these systems are over 20 years old. They have been heavily modified and do not interface with other systems.

- Improved customer information and profitability systems require that older systems be redesigned so that they can interface.

- Consolidation of multiple bank IS departments under a single holding company division has created a need for either a single system or compatible systems that can service all banks within the holding company.

Information delivery within the organization is creating a high demand for query and customer information systems. External delivery of information is being driven through the ATM/POS networks. These networks are providing a vehicle for customer information and services that can provide a competitive advantage to financial institutions.

- More information will be gathered by these systems in the future. All techniques will be used to help gather information and initiate new services.

- New types of ATM/POS units should be anticipated (e.g., touch screens in place of keyboards and the use of smart cards or other technology to handle ATM or POS transactions off-line).

About fifty percent of the major new systems are being developed by internal staff, 27% are developed externally via packages and contract personnel, and 22% are developed by both internal and external resources. The use of both internal and external resources is caused by the rapidly changing competitive and regulatory environment and banks' views of information as an operational necessity.

Exhibit IV-6, IV-7, and IV-8 summarize the major applications activity in the banking and finance sector. Note that new application development activities now represent more than 60% of typical software staffing.

F

Budget Analysis

Exhibit IV-9 shows the 1987 budget distribution and the projected growth of budget categories in 1988. Expenditures for "other hardware" is the only budget category projected to decrease.

Data communications and microcomputers have the largest estimated growth rate of 8.1% in 1987.

Personnel expenses continue to grow and account for slightly more than 40% of total IS budgets.

An estimated fifty-six percent of the respondents in the banking sector will decrease budgets in 1988. Companies with increasing budgets will slow the rate of increase in 1986-1987 (see Exhibit IV-10).

EXHIBIT IV-6

BANKING AND FINANCE EMPHASIS IN 1987

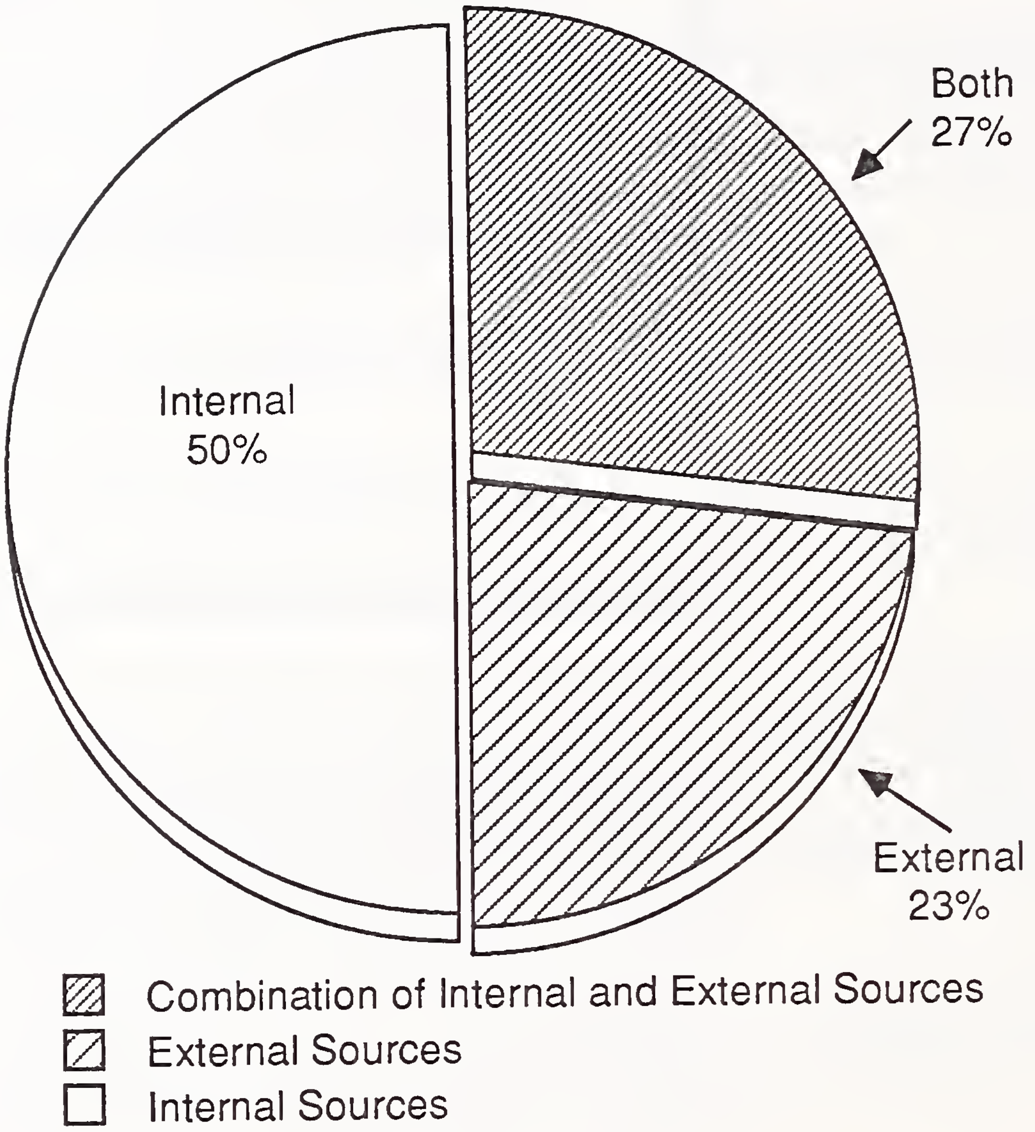
- International Lending, Foreign Exchange Trading, and Foreign Debt Monitoring and Restructuring
- Integrated Retail and Wholesale Deposit System
- Securities Processing and Analysis for Trading Purposes and Portfolio Management
- Converting Central Files to Data Base Management System
- Electronic Data Interchange and Distribution

Once again, personnel expense leads the list of reasons for increased 1986 IS budgets, followed by hardware and software purchases. New contributing factors (facility expansion, disaster recovery services, and supplies expense) validate a trend toward increasing importance of areas outside traditional hardware and software purchases (see Exhibit IV-11).

Exhibit IV-12 reveals that the "traditional" areas of personnel expense and new hardware purchases will propel expected 1988 MIS budget increases. Facility expansion or changes will continue to play a greater role in IS budgets as equipment is consolidated into existing sites or end users invest in new computer facilities.

EXHIBIT IV-7

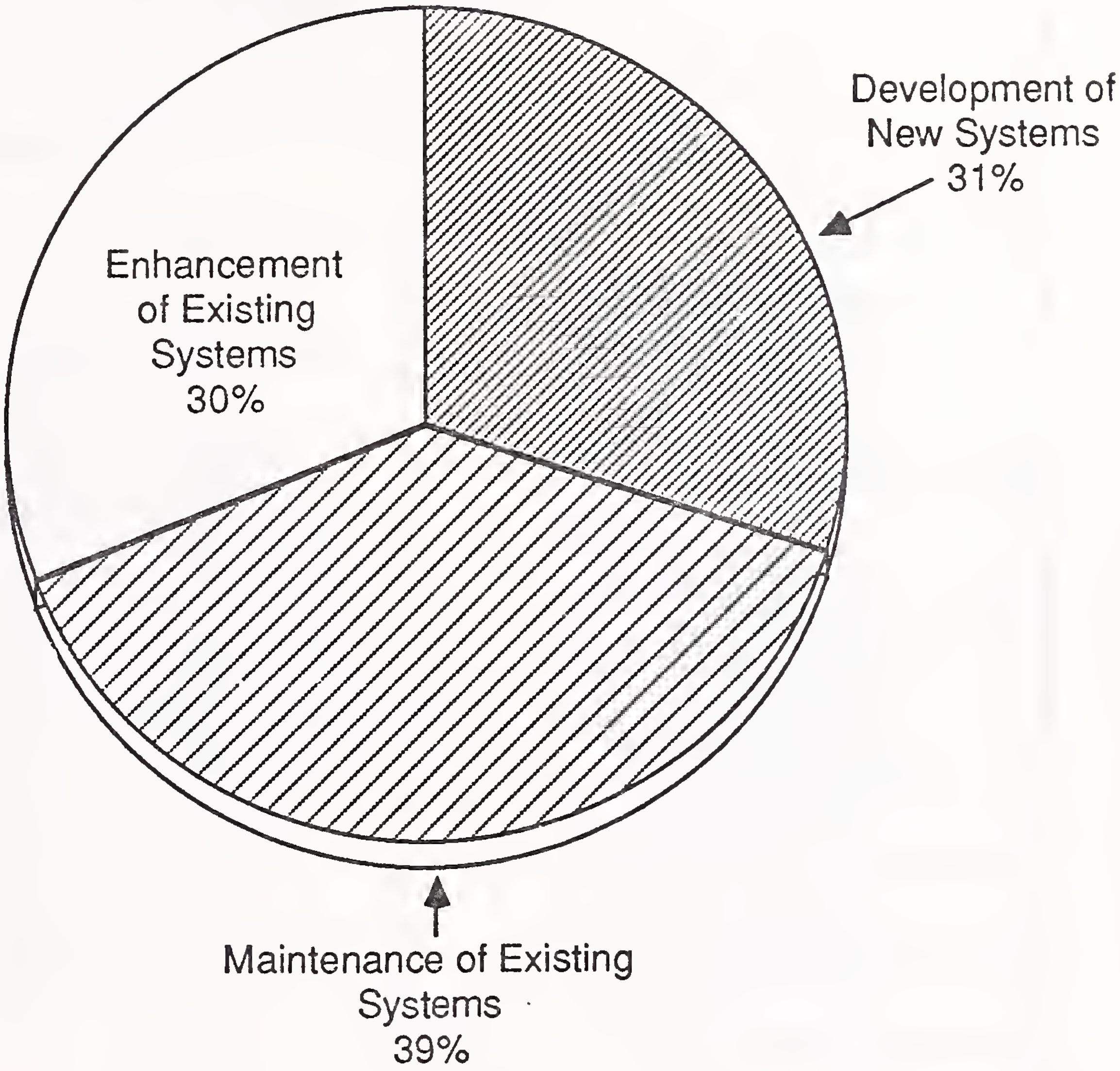
BANKING AND FINANCE SOURCE OF DEVELOPMENT FOR NEW MAJOR APPLICATIONS



Cost Range of New Application Software: Very low for PC packages for portfolio management or profitability analysis; $8,000,000 or more for large integrated maintenance systems.

EXHIBIT IV-8

BANKING AND FINANCE ASSIGNMENT OF APPLICATION DEVELOPMENT STAFF



Percent of Application Development Staff

EXHIBIT IV-9

1986 BUDGET DISTRIBUTION AND 1987/1988 CHANGES IN THE BANKING AND FINANCE SECTOR

BUDGET CATEGORY	ESTIMATED 1987 PERCENT OF I.S. BUDGET	1987-1988 ESTIMATED BUDGET GROWTH
Personnel Salaries and Fringes	40.1	1.8
Mainframe Processors	8.2	6.1
Minicomputers	1.2	3.0
Microcomputers	5.0	8.1
Mass Storage Devices	5.4	6.2
Other Hardware	6.5	(2)
Total Hardware	26.3	1.4
Data Communications	10.2	8.1
External Software	2.8	4.8
Professional Services	1.7	1.5
Turnkey Systems	0.8	0.3
Software Maintenance	0.9	6.4
Hardware Maintenance	8.3	3.0
Outside Processing Services	1.1	1.4
Other	7.8	1.6
Total	100.0	2.6

EXHIBIT IV-10

BANKING AND FINANCE MOST 1988 I.S. BUDGETS WILL DECREASE COMPARED TO 1987

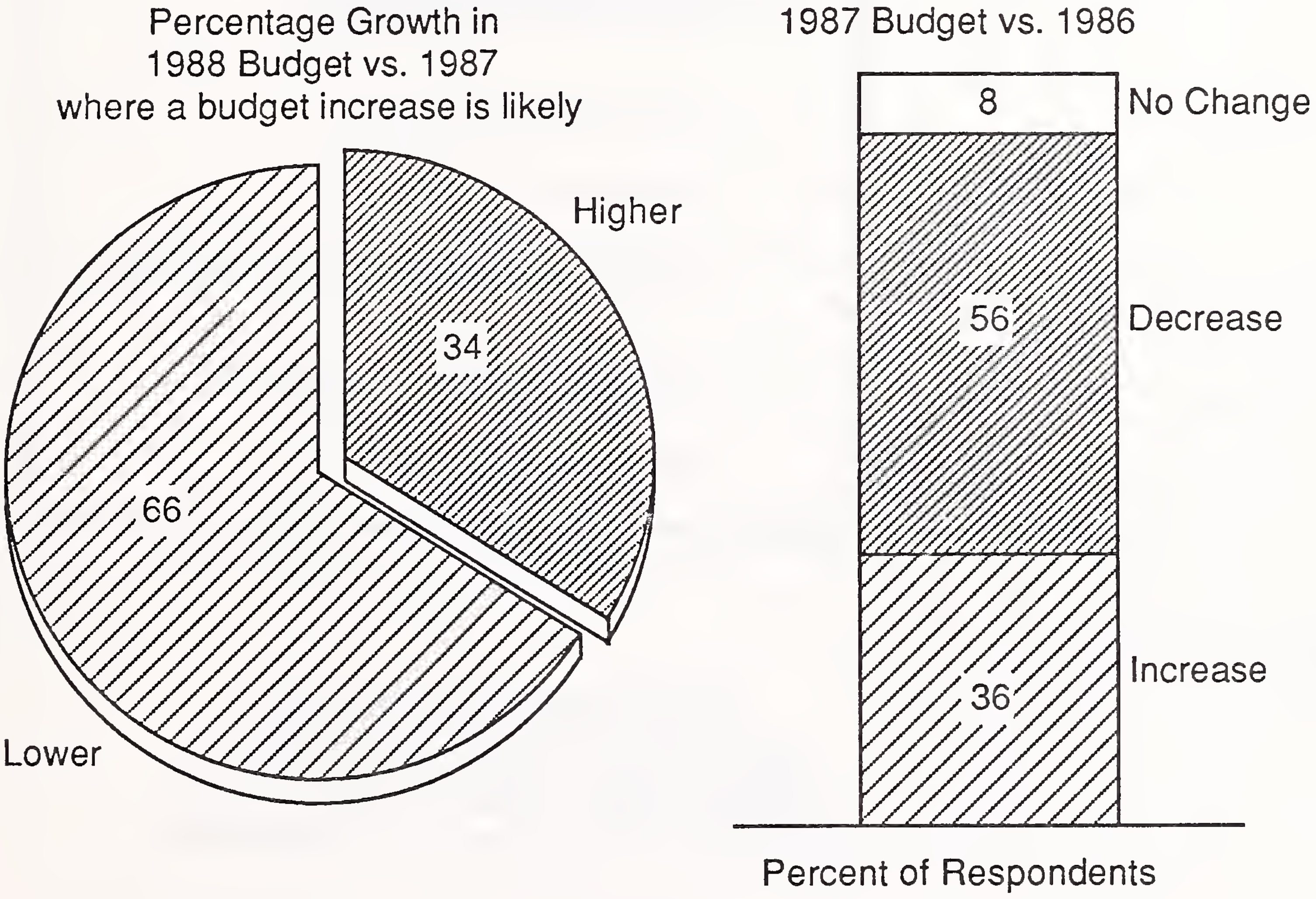


EXHIBIT IV-11

BANKING AND FINANCE FACTORS CONTRIBUTING TO INCREASED 1987 I.S. BUDGETS (In Order of Frequency of Mentions)

- Personnel Expense
- Hardware Purchases
- Software Purchases
- Hardware Maintenance
- Facility Expansion/Enhancement
- Disaster Recovery Services
- Supplies Expense

EXHIBIT IV-12

BANKING AND FINANCE FACTORS CONTRIBUTING TO INCREASED 1988 I.S. BUDGETS (In Order of Frequency of Mentions)

- Personnel Expense
- Hardware Purchases
- Facility Expansion or Change
- Hardware Maintenance
- Communications Costs

V

Opportunities

V

Opportunities

A

Market Niches

The Banking and Finance segment is too large and complex for any one vendor to be all things to all sectors. The opportunities are many, but vendors must strategically select market niches which are financially attractive and which match vendors' technology, technical expertise, and distribution capabilities.

For example, the shift to merchant banking (investment banking in disguise) is a business line requiring new and innovative financial information system products and services.

Additionally, computer services industry consolidation/partnering will occur to provide total solutions in targeted market niches.

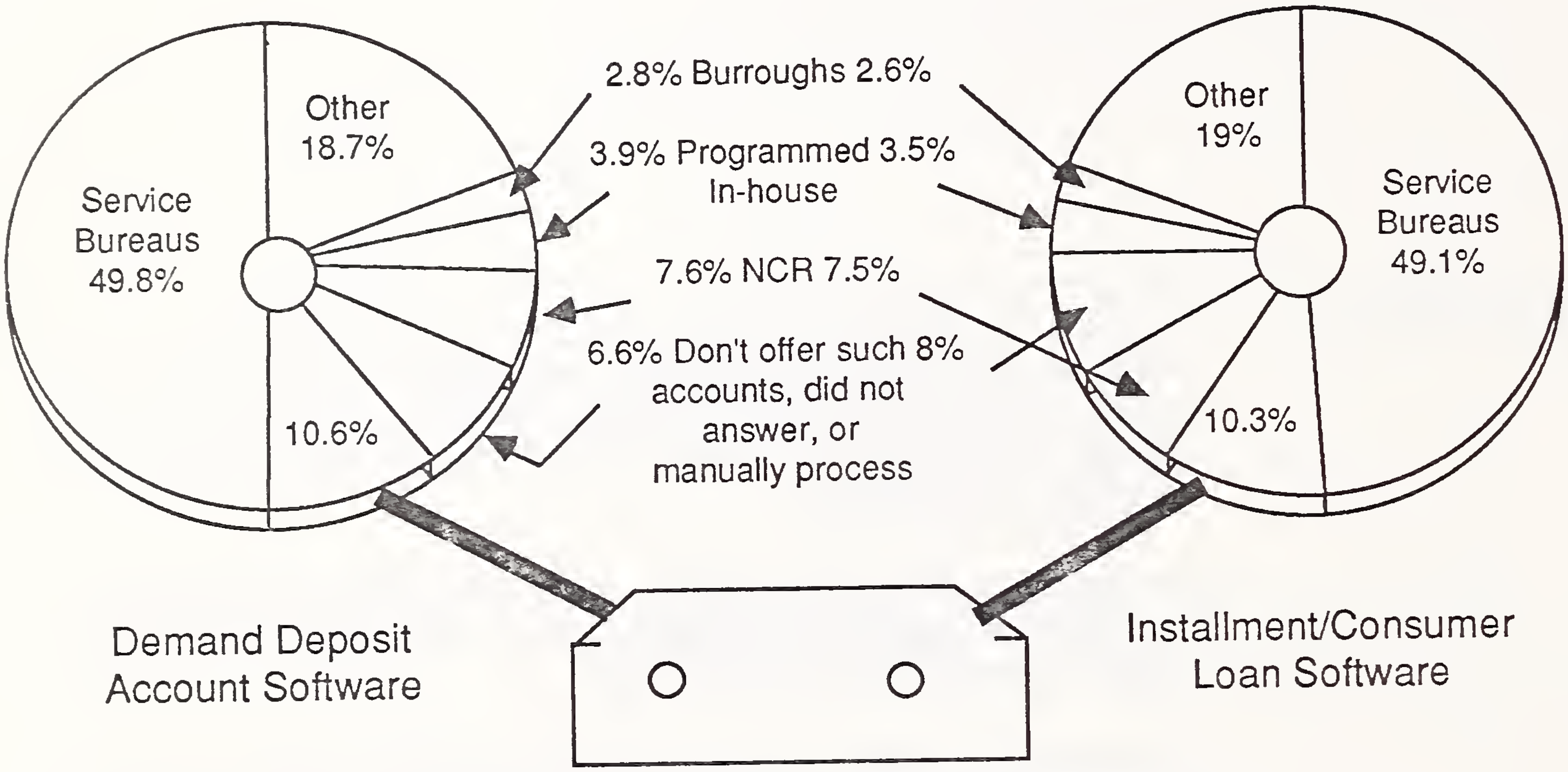
Industry competition is creating demand for decision support systems beyond those used in the corporate environment. In the personal services area, brokers, retailers, and other nonbank financial groups will require financial data and services to address customer needs. Products included will be portfolio analysis systems, market analysis systems, and many more, including on-line data bases.

Many of the emerging opportunities will require sophisticated solutions, often multidisciplinary. Hardware and other vendors will require partners and subcontractors to provide complete solutions. These requirements will continue to create opportunities for smaller and highly specialized vendors. Specific opportunities will exist in developing programs to educate personnel on security and security procedures, in systems development, and in the implementation of new systems and the replacement of old ones.

EXHIBIT V-1

PRIMARY APPLICATIONS SOFTWARE FOR BANKS AND THRIFTS

WHO HAS WHAT MARKET SHARE?



Source: American Banker, June 1987

B

Value-Added Networks

Banking and finance services are increasingly being delivered electronically. The key to successful processing services offerings will be value-added network services offerings. Vendors must possess the capability of converting, interfacing with, and transmitting a wide variety of information protocols and message formats.

On-line data base services opportunities exist for selling to banks and partnering with banking and financial institutions. Consumer credit reporting is already the largest on-line data base market, yet it has great potential remaining. Check and credit data bases will continue to expand, as will securities.

As financial institutions become increasingly competitive, they will also need more access to marketing and demographic data bases. Obviously, the best data bases for vendors are dynamic, which are less susceptible to optical technologies like CD-ROM.

Security and commodity firms themselves are offering an ever-increasing variety of financial services to individual investors, services which require both software products and network services.

The area of check clearance is no longer the exclusive province of the Federal Reserve Banks. The requirement for the Federal Reserve Bank to price services has opened the door for information services vendor competitive offering for automated clearinghouse (ACH) services, both regional and national, and check-processing services for regional/local bank clearinghouse associations.

C

Processing Services

There are very attractive opportunities in processing services, a market growing at 15% during the forecast period.

Successful vendors will be alert to opportunities that leverage their processing and network technology to offer add-on services to their existing client base or directly to other market areas. Examples are data capture, balancing, and consolidation for retailers who operate POS credit card terminals and providing total marketing services with credit card voice authorization technology.

Information services vendors must be alert to opportunities for providing processing and other services to groups of financial institutions formed to support operations under changing market conditions. Examples are managing local/regional ACHs and managing information services for bankers' banks.

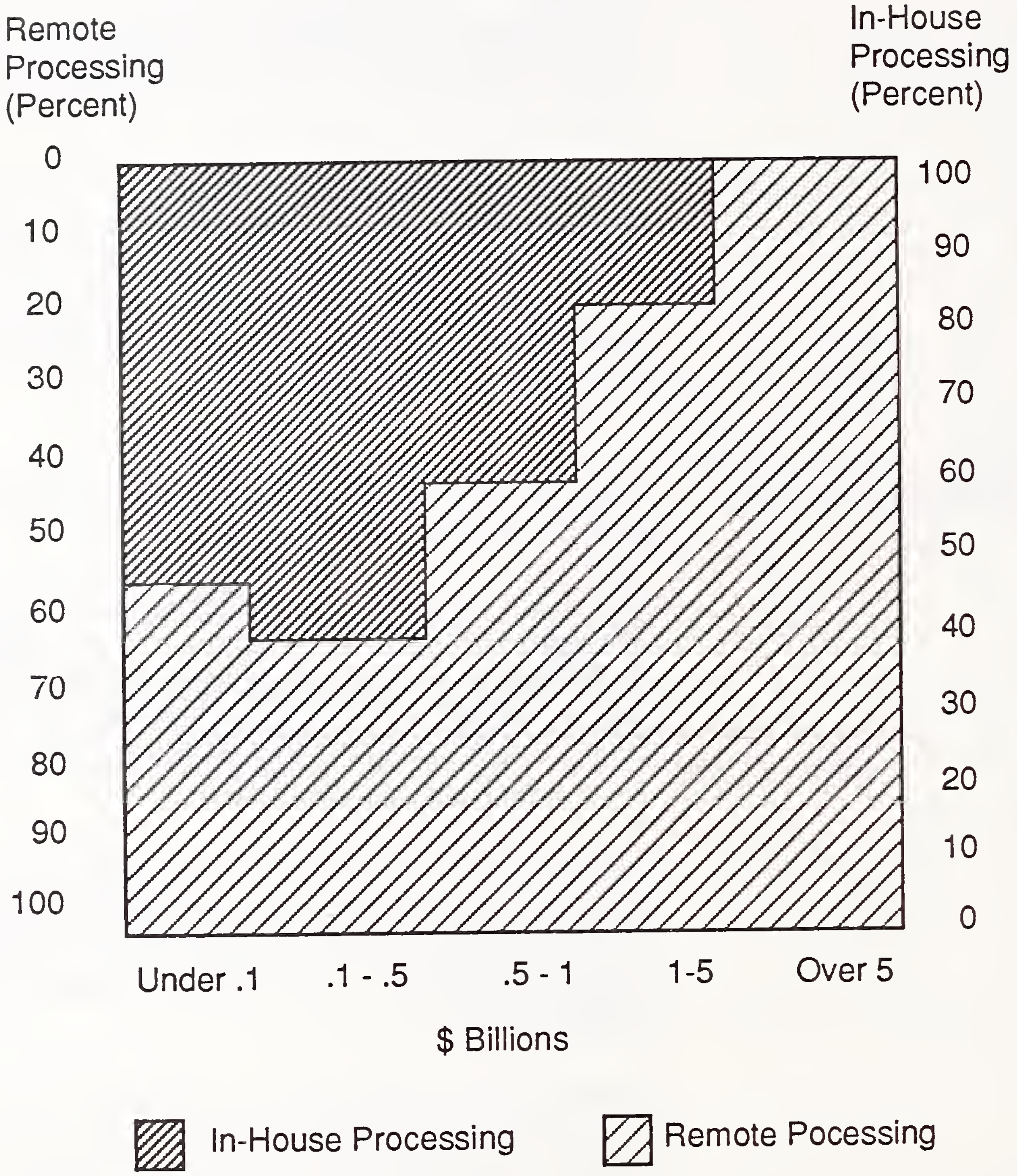
Now utilizing valuable resources and finding it marginally profitable, many commercial banks are looking to move out of the correspondent bank processing business. Information services vendors, both bank and commercial, can expand their market share through acquiring this business.

Required to increase capital, selected banks are candidates for divesture of FM arrangements to computer service companies.

In troubled financial times financial institutions are much more willing to shed services not directly related to their main business functions. Financial holding companies are more willing to sell off or make FM arrangements for managing S&L or bank service companies. Carefully targeted banks can be induced to sell off–and then offer under private label arrangements–correspondent bank processing services.

EXHIBIT V-2

REMOTE PROCESSING VERSUS IN-HOUSE PROCESSING IN BANKS



Source: Computers in Banking 1987

Professional services vendors can successfully leverage expertise in data base management systems to offer, through partnering arrangements, implementation services for converting and establishing financial institution customer information bases.

D

Security

Security is a major issue in banking and finance markets. The issue will greatly increase in importance as the volume of electronic transactions grows to be a significant portion of all financial transactions by the end of the decade. Processing vendors must themselves acquire or form partnerships to obtain secure data systems at terminal entry points, or between interchange points and central or distributed hosts.

The baseline defense of host financial information systems is seen to be selectively layering available technology to prevent both external and internal end users and computer systems operation and programming personnel from gaining unauthorized access to software, micro code, and corporate and consumer data bases that are part and parcel of banks' operational activity.

In the area of security, new software will be needed to protect from fraud in financial transaction systems and networks. The application of pattern recognition technologies will be an opportunity, as will disaster recovery services for these highly time- and data-sensitive applications.

Documentation control, fire protection, and legal and insurance requirements are other areas where policies for security are required.

Finally, a technology strategy is needed to ensure that the "core defense" is implemented in line with the "risk/reward" tradeoffs. In this instance, risk/reward simply means the tradeoff of providing "absolute" security versus the cost of protecting against the potential for fraud or other loss.

Exhibit V-3 compares current security methodologies by cost and effectiveness.

E

Strategic Partnering

In a recent INPUT report on professional services opportunities, INPUT emphasized the importance of strategic partnering in providing system integration and software implementation services and of participating in the evolution of new distribution channels.

- The trend is toward providing total solutions to end users.
- The proliferation in personal computers and intelligent terminals is resulting in end users with a greater understanding of computer-based solution possibilities, a primary marketing focus.

EXHIBIT V-3

LEVELS OF SECURITY

LEVEL	OPTION	ADVANTAGES	DISADVANTAGES
1	Passwords	Low Cost	Most Vulnerable
2	Terminal IDs	Low Cost	Inflexible
3	Security Monitors	Good Security Audit Trail	High Cost Needs Administration Susceptible to Systems Programmers
4	Encryption	High Security	Major Cost Degrade System Performance Needs Administration
5	Telephone Access Controllers	Good Internal Security High External Security Good Audit Trails Analog System	Internal Security Susceptible to Systems Programmers
6	Smart Cards	Very High Security Authentification of Both User and Host Flexible	Currently High Cost Needs Administration

- The competitive edge has shifted from hardware power and product functionality to expertise in vertical markets and marketing and distribution.

- Hardware vendors—even IBM—are moving out into the marketplace to seek needed market resources to deliver their products and services.

It is clear that banking and finance markets are going national. Vendors must establish a national presence directly or through carefully selected partnering arrangements.

Medium to very large bank holding companies are excellent targets for offering information services and for strategic partnering arrangements.

Information services vendors may obtain a high degree of synergy through strategic partnering. The partnering should be for clearly defined objectives such as national market coverage, implementation capability, market expertise, etc. Successful partnering may well be the prelude to future merger/acquisition possibilities between interested parties.

F

Special Product Area Opportunities

1. Applications Software

Applications software products specific to the banking and finance industries will be a $3.0 billion market in 1992.

The financial market has always been the largest purchaser of applications software. Given the demand for new systems and the time requirements for these systems, banking and finance companies will continue to choose the buy side of the make/buy decision. All the trends support the growth of this practice. Vendors will also find financial institutions willing to jointly fund or partner particularly large projects such as financial transaction software and network development.

The software for the mainline operations of demand deposit accounting, savings, loans, and administration is, for the most part, obsolete. Banks and other financial institutions need new software that integrates the customer data base with major applications and can handle electronic transaction rates.

Exhibit V-4 cites examples of most frequently installed applications software for the banking and finance industry.

2. Third-Party ATM/POS Services

The days of brick and mortar branching are over. Even after pricing retail services closer to cost, Bank of America is still closing over 200 branches in California. Citibank has begun testing automated banking units (no tellers), including Citibank's CAST (Customer Activated Service Terminals) system.

The growth of electronic banking has been phenomenal, but is likely to be relatively flat in 1987 and 1988.

Both ATM and POS networks can be expected to expand during the next decade. Home banking and automated check clearing will also grow, as shown in Exhibit V-5.

EXHIBIT V-4

LEADING INDUSTRY-SPECIFIC APPLICATION SOFTWARE FOR THE BANKING AND FINANCE INDUSTRY

Top 10 Minicomputer Software Applications

1. Word Processing
2. General Ledger
3. Funds Transfer
4. Asset/Liability Management
5. Savings/DDA
6. Mortgage Loan Processing
7. Checking/DDA
8. Commercial/Installment Loan
9. Trust Management
10. Teller/Branch Automation

Top 10 Microcomputer Software Applications

1. Spreadsheets
2. Word Processing
3. Financial Planning
4. Asset/Liability Management
5. Graphics
6. Data Base Management
7. Strategic Planning/Decision Support
8. Loan Origination
9. Funds Transfer
10. Customer Information File

Top 10 Mainframe Software Applications

1. Checking/DDA
2. Savings/DDA
3. Certificates of Deposit
4. General Ledger
5. Commercial/Installment Loans
6. Customer Information File
7. ATMs
8 Mortgage Loan Processing
9. Teller/Branch Automation
10. Payroll Processing

Not all of these industry institutions will develop their own ATM/POS networks nor will they wish to align themselves with potential competitors. Therefore, opportunities for network services vendors to offer third-party selections will exist and prosper.

3. Systems Integration for Nonstop Turnkey Solutions

Services are increasingly targeted toward larger institutions and multi-bank holding companies.

Facility management and system integration arrangements are forecast to be particularly attractive for medium to large institutions across all sectors during the decade. The role of the system integrator will become increasingly important as the distinction between information processing and telecommunications technology becomes blurred.

System integration opportunities will be plentiful throughout the banking and finance sector. The complexity of transaction processing systems, expanded networks, and increasing transaction volume will all contribute. System integrators need to understand the technology in depth and form alliances to build and implement these complex systems.

- Product and services offerings are increasingly national in nature.

- Total solutions are seen to be the order of the day, while networks play an increasingly important role.

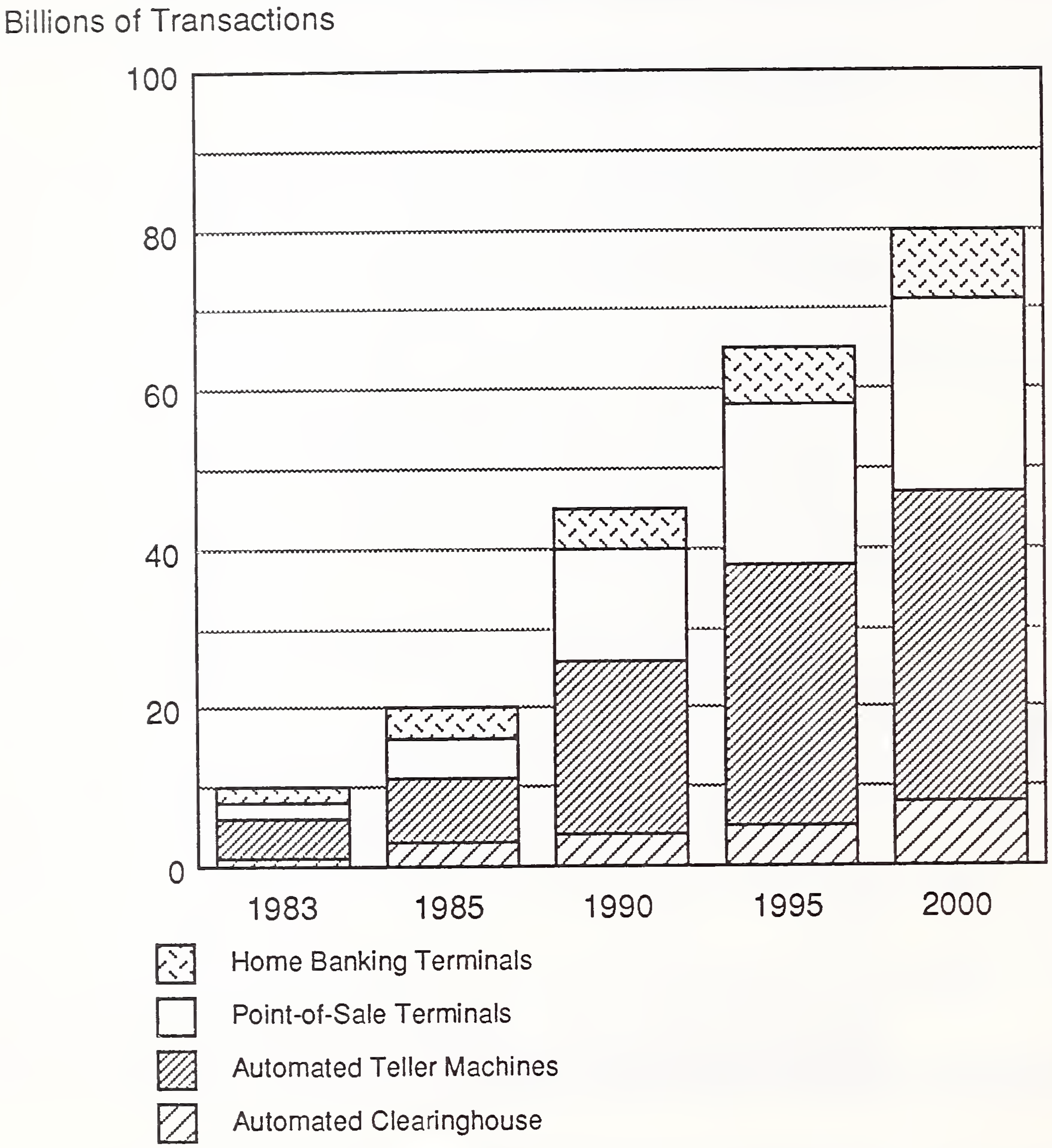
As the industry becomes more dependent on automation, the need for nonstop processing architectures and turnkey opportunities will emerge for vendors in selling to independent banks currently using outside services. Other turnkey opportunities will emerge at the departmental level for systems to handle transaction processing and network management.

Strategic partnering with fail-safe IBM plug-compatible hardware vendors could easily result in a "turnkey solution" to what would otherwise become a nightmare situation with the rising tide of the electronic transactions initiated through bank debit cards.

Software and turnkey systems vendors must focus on independent service organization (ISO) and value-added reseller (VAR) arrangements with leading hardware vendors in order to offer systems integration services that produce turnkey systems in banking and finance markets.

EXHIBIT V-5

FORECAST OF U.S. ELECTRONIC PAYMENTS
1983 - 2000



Source: Federal Reserve Board (FRB), American Bankers Association (ABA)

VI

Conclusions and Recommendations

VI

Conclusions and Recommendations

The banking and finance industry is experiencing changes that will profoundly affect what products are offered and which methods of delivery are preferred.

The traditional banking philosophy no longer suffices. To remain competitive, the industry must expand services and approach new markets, and it must remain flexible to be able to respond to change.

Technology is now available that permits more complex products and services, but development is dependent on the regulators of banking and finance providers. Relaxation of the distinctions between financial providers–banks, brokers, credit unions, and the like–is creating a confused marketplace where there is much overlap.

The opportunities in this marketplace are numerous, but vendors must monitor the trends in regulation as well as the developments in technology.

The market window is open for new entrants, and there are more competitors than ever before. Strategic partnering is one strategy that increases the potential for success. Market participants will come from within and outside the industry, as former customers transform into service ad product suppliers.

Key areas that appear particularly ripe for product development are:

- Integrated banking applications and systems.
- Communications networks and on-line product delivery.
- Nonstop processing.

- Applications software for minicomputers and microcomputers.
- Professional services for software development, education, and training, and particularly, system integration.
- Treasury workstations for mid-range industrial companies.

BF-A

Appendix: Forecast Data Base

BF-A

Appendix: Forecast Data Base

This appendix contains the following, as shown in Exhibits BF-A-1 through BF-A-6:

- Market size by delivery mode for each year 1986-1992.
- Market growth rates for 1986-1987.
- Average annual growth rate (AAGR) for each delivery mode for the five-year period 1987-1992.

These forecasts are for industry-specific services and products only. Excluded are cross-industry products and services such as systems software and value-added network services.

EXHIBIT A-1

N

INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST
BANKING AND FINANCE IDUSTRY SECTOR
1987 - 1992

Segmentation by Delivery Mode	($Millions) 1986	1986/ 1987 Growth (Percent)	($Millions)						1987/ 1992 AAGR (Percent)
			1987	1988	1989	1990	1991	1992	
Processing Services									
Remote Computing/ Batch	2800	16	3256	3777	4381	5060	5870	6714	16
Facility Management	990	14	1131	1289	1469	1675	1910	2151	14
Total Processing	3790	16	4387	5066	5850	6735	7780	8865	15
Applications Software									
Mainframe/ Mini	999	19	1189	1391	1614	1856	2116	2392	15
Micro	131	43	187	256	338	432	534	643	28
Total Applications Software	1130	22	1376	1647	1952	2288	2650	3035	17
Turnkey Systems	668	11	741	823	914	1014	1126	1249	11
Professional Services	1417	22	1723	1991	2337	2802	3292	3868	18
Sector Total	7005	17	8227	9527	11053	12839	14848	17017	16

EXHIBIT A-2

INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987 - 1992 COMMERCIAL BANKS

Delivery Mode	($Millions) 1986	1986/ 1987 Growth (Percent)	($Millions)						1987/ 1992 AAGR (Percent)
			1987	1988	1989	1990	1991	1992	
Processing Services									
Remote Computing/ Batch	1619	16	1878	2178	2526	2931	3399	3942	16
Facility Management	704	15	811	931	1061	1210	1379	1550	14
Total Processing	2323	16	2689	3109	3587	4141	4778	5492	15
Applications Software									
Mainframe/ Mini	704	17	823	946	1085	1335	1406	1592	14
Micro	70	43	100	129	166	215	264	309	25
Total Applications Software	774	19	923	1075	1251	1550	1670	1901	17
Turnkey Systems	397	11	437	488	544	605	674	749	11
Sector Total	3494	16	4049	4672	5382	6296	7122	8142	15

EXHIBIT A-3

INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987 - 1992
SAVINGS AND LOANS

Delivery Mode	($Millions) 1986	1986/ 1987 Growth (Percent)	($Millions) 1987	1988	1989	1990	1991	1992	1987/ 1992 AAGR (Percent)
Processing Services									
Remote Computing/ Batch	331	15	380	437	503	578	665	764	15
Facility Management	79	15	91	101	111	122	134	147	11
Total Processing	410	15	471	538	614	700	799	911	14
Applications Software									
Mainframe/ Mini	166	13	187	212	242	274	308	345	13
Micro	29	24	36	46	58	74	96	123	27
Total Applications Software	195	14	223	258	300	348	404	468	16
Turnkey Systems	115	16	134	147	162	178	195	215	10
Sector Total	720	15	828	943	1076	1226	1398	1594	14

EXHIBIT A-4

INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987 - 1992
SECURITIES AND COMMODITIES

Delivery Mode	($Millions) 1986	1986/1987 Growth (Percent)	($Millions)						1987/1992 AAGR (Percent)
			1987	1988	1989	1990	1991	1992	
Processing Services									
Remote Computing/ Batch	402	20	481	556	644	744	860	995	16
Facility Management	140	11	155	175	197	223	252	284	13
Total Processing	542	17	636	731	841	967	1112	1279	15
Applications Software									
Mainframe/ Mini	48	29	62	82	105	130	161	194	26
Micro	11	46	16	22	31	44	61	85	40
Total Applications Sorfware	59	32	78	104	136	174	222	279	30
Turnkey Systems	129	9	140	155	172	191	212	275	14
Sector Total	730	17	854	990	1149	1332	1546	1833	16

EXHIBIT A-5

INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987 - 1992
OTHER BANKING/FINANCE

Delivery Mode	($Millions) 1986	1986/ 1987 Growth (Percent)	($Millions)						1987/ 1992 AAGR (Percent)
			1987	1988	1989	1990	1991	1992	
Processing Services									
Remote Computing/ Batch	448	15	517	606	708	807	946	1013	14
Facility Management	67	10	74	82	100	120	145	170	17
Total Processing	515	14	591	688	808	927	1091	1183	15
Applications Software									
Mainframe/ Mini	81	44	117	151	182	205	241	261	18
Micro	21	66	35	59	83	99	113	126	29
Total Applications Software	102	49	152	210	265	304	354	387	20
Turnkey Systems	27	11	30	33	36	40	45	50	11
Sector Total	644	19	773	931	1109	1271	1490	1620	16

EXHIBIT A-6

INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987 - 1992
TOTAL SECTOR, PRODUCTS ONLY*

Delivery Mode	($Millions) 1986	1986/ 1987 Growth (Percent)	($Millions)						1987/ 1992 AAGR (Percent)
			1987	1988	1989	1990	1991	1992	
Processing Services									
Remote Computing/ Batch	2800	16	3256	3777	4387	5060	5870	6714	16
Facility Management	990	14	1131	1289	1469	1675	1910	2151	14
Total Processing	3790	16	4387	5066	5856	6735	7780	8865	15
Applications Software									
Mainframe/ Mini	999	19	1189	1391	1614	1856	2116	2392	15
Micro	131	43	187	256	338	432	534	643	28
Total Applications Sorfware	1130	22	1376	1647	1952	2288	2650	3035	17
Turnkey Systems	668	11	741	823	914	1014	1126	1249	11
Sector Total	5588	16	6504	7536	8722	10037	11556	13149	15

* Professional services not included.

BF-B

Appendix: Banking and Finance Sector Definitions

BF-B

Appendix: Banking and Finance Sector Definitions

Authenticate - To determine the accuracy of a user's identity or a message's certification of its time or place of origin.

Automated Clearing House (ACH) - An automated clearing house exchanges payments between members via computer media such as magnetic tape. The ACH is formed by an association of private depository institutions. Most of the current ACHs are located in the premises of Federal Reserve Banks. The ACHs in Chicago and New York are privately operated.

Automatic Teller Machines (ATM) - Allow consumers to initiate deposits to, cash withdrawals from, and make other transactions for their bank or S&L accounts.

Bank Customer Profitability Analysis - A Statement of the activity cost in an account and the adequacy of the compensation to the bank.

Cash Management System - A group of applications that include:

- Information for a bank customer on balances, transactions, pending transactions, and operational products. It is gathered within the bank and from other banks.

- General information on services and interest rates.

- The capability of initiating transactions, particularly funds transfer.

Check Guarantee - Check guarantee is that process by which the services vendor guarantees that uncollectible checks will be purchased at predetermined discounted value from the retailer without recourse. The vendor takes whatever action is necessary, if any, to recover funds from the consumer.

Check Truncation - The process whereby the movement of a paper check is stopped at the depository institution first receiving the check. Pertinent information is converted to an electronic image and processed by the payments clearance system; the customer receives a descriptive account statement. Facsimile check copies are made available as necessary in response to inquiries.

Check Verification - Check verification is a process by which the vendor advises the retailer of the likelihood that the check is good or bad based on negative data held in the vendor's data base. The retailer retains liability for uncollectible checks.

Clearance - Clearance is the process whereby retailer check deposits move from the depositing bank through a clearance bank (often the Federal Reserve) to the bank on which the check was drawn.

Clearing House Inter Bank Payment Systems (CHIPS) - An automated clearing facility operated by the New York Clearing House Association, which processes international funds transfers among its members.

Credit Card Authorization - Credit card authorization is the process whereby the services vendor either declines authorization; approves the credit transaction within preprescribed limits; or obtains, as necessary, approval from the financial institution holding the credit card account. Credit card losses are borne by the participating financial institution. Provision for credit card losses are bundled in the discount rate on credit card charge amounts the merchant pays for credit card services.

Cryptography - A form of access control applicable to sensitive resources that are beyond the scope of program access control and physical access control.

Debit Card - A card that identifies the holder of a deposit account. It is generally used in conjunction with ATM or point-of-sale (POS) terminals and aids in the withdrawal of funds. When used with a POS terminal, the funds are then deposited from the buyer's account into the seiler's account.

Electronic Cash Register (ECR) - An electronic cash register operates as a point-of-sale (POS) terminal with respect to credit card authorization/ check guarantee. ECRs also handle sales, data capture, balancing, and inventory control.

Electronic Funds Transfer Systems (EFTS) - These systems use terminals, telecommunications, and computers to accomplish funds transfer between parties, which may be consumers, corporations, or financial service institutions.

Encryption - A process for protecting program and data that must be stored on or transmitted over media that cannot be otherwise protected against unauthorized monitoring.

Financial Inquiry Services (FIS) - Provide on-line access to a wide range of security, commodity, bond, money instrument, interest rate, foreign exchange, and option price data bases directly related to activity on national exchanges. The services include the data base, remote computers, the communication network, communication controllers, and the inquiry terminals.

GIRO - A payment system in which a bank depositor instructs his bank to transfer funds from his account directly to creditor accounts and to advise the creditors of the transfers. The depositor can specify the amount to be paid, in contrast to a preauthorized debit, which withdraws the same amount or the full amount of the bill each month.

Interchange Network - VISA and MasterCard operate electronic switching networks that route credit card authorization messages as necessary between processing participants and financial institutions of record.

Investment Performance Analysis - The evaluation of investment practices relating to market performance of security holdings.

Lock Box (Wholesale/Retail) - A special post office box used by a bank to receive customer payments and accelerate the collection of funds by reducing mail and check-clearing float. Lock boxes are usually classified as retail (high-volume, low-dollar amounts) or wholesale (low-volume, high-dollar amounts).

Money Market Trading - Provides a brokerage service for use by corporations and individuals wishing to invest their excess cash in short-term money market instruments.

Money Market Sweep - A review of the balances in a group of customer accounts after the close of daily business that will automatically invest all funds above a set amount in money market funds.

Negotiable Order of Withdrawal (NOW) Account - A special account that pays a rate of interest and provides check capabilities. The consumer writes a NOW draft (similar to a check) which, when countersigned by the depository institution, allows for third-party payment.

On-line - A computer system in which source data are collected through input devices that directly feed and are controlled by the computer itself, which may belong to or be located at another institution. Examples of this are the Chemlink balance reporting system and most data processing or switching facilities.

Password - Data a user provides for purposes of authentication.

Point of Sale (POS) Device - A device located at a retail outlet–such as an electronic cash register, a key pad activated credit authorization, or check guarantee terminal–for handling both authorization and transaction information.

Query - A request for information from a data base, specifically one for data collected from a number of records and presented as a sum, average, etc.

Same-Day Transaction Reporting - Provision to send details on debit and credit activity to a customer terminal periodically during the day.

Securities Transaction Reporting - The use of on-line timesharing facilities to obtain current and pending security transaction information.

Security Custody Accounts - A service rendered by banks and depository institutions, usually located in metropolitan areas, whereby securities are received for safekeeping in the vault of a bank for a service fee. This service can include buying and selling of securities, collection of dividends and interest payments, transfer of ownership, and automatic credit and debit entries to the depositor's account.

Settlement - Settlement is the process whereby credit card transactions, once balanced at the retail level, are entered at the depositing bank or services vendor, sorted by the institution servicing the retailer, transmitted, and the net funds due each participant determined (or settled).

Switching Facility - A facility that links ATM and POS terminals to depository and credit-granting institutions to accomplish instantaneous authorization and fund transfers. It also links and sorts the credits and debits of institutions in an ATM or POS network.

Wire Transfers - The electronic transfer of funds from one institution to another through the Federal Reserve Wire, Bankwire, or Swift systems.

About INPUT

INPUT provides planning information, analysis and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning, This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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Discrete Manufacturing

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I

Issues, Trends, and Events

I

Issues, Trends, and Events

This section discusses issues, trends, and events that affect or impact the manufacturing sector. Primarily, American manufacturers have a major concern about improving productivity to become more competitive in domestic and worldwide markets.

This concern is complicated by a complex economic environment. The very large U.S. balance of trade, a negative $151 billion in 1986, possible tax increases in 1988, the potential for protectionist legislation in Congress, the need to reduce the U.S. budget deficit in 1988 and beyond, and the potential for a 1988 recession if consumer spending slows are all uncertainties that complicate the manufacturing outlook.

The long-term growth trends are still moving upward, but at a steadily decreasing rate. Total U.S. manufacturing shipments will grow only 2% from 1986 to 1987. However, the discrete manufacturing industry is the second largest market sector in terms of information systems spending and represents a significant opportunity for many vendors.

A

Productivity

The U.S. manufacturing sector is steadily losing market share to imported products. Nearly two-thirds of near-term growth in U.S. markets will be claimed by imports. Although the rapidly falling dollar may make U.S. imports more competitive, this is no guarantee of success as barriers to entry must be overcome.

Investment in information systems will increase by 16% during the 1987-1992 period, with food, computer, and electronics segments being most aggressive. Most large manufacturers have already invested in manufacturing planning and control systems (MPCS), which have become a mature market at the high end.

Investment in computer-aided manufacturing (CAM), design (CAD), engineering (CAE), and maintenance (CAMM) tools is a newer market and growing more rapidly.

The widespread recognition that company-wide automation systems are necessary for economic survival has been accepted as gospel by most large manufacturers and more and more smaller firms are recognizing this also. This trend has been generally identified with the phrase "computer-integrated manufacturing."

B

Computer-Integrated Manufacturing (CIM)

CIM is defined as the integration of separately automated factory functions, including MRP II, CAD/CAM/CAE, DSS, robotics, ATE and more. It is important to recognize that CIM is a process and a philosophy, not an event. Neither is it a panacea, as implementation will take time, money, commitment, expertise and patience.

There are major barriers to CIM:

- lack of technical knowledge and understanding.
- lack of management support.
- resistance to change.
- cost justification.

These barriers will not be removed easily.

General Motors has made a $40 billion commitment to CIM, and has been a prime mover in the evolution of MAP (see next section). Ford Motor Company is soon to make a company-wide major investment. Boeing has embraced the concept and has begun planning for large-scale implementation. Other very large companies are also involved deeply. Forecasts of CIM expenditures project $100 billion by 1992. While an exact timetable is difficult to forecast, the potential is there.

Declining costs of microprocessors, and their dramatically increased power, will propel smaller companies into CIM. This may serve to offset any resistance to implementing large-scale systems at very high cost.

C

MAP (Manufacturing Applications Protocol)

MAP is a tool with which to build a foundation for CIM, providing a series of protocols for connecting mixed vendor hardware/software systems.

General Motors sponsorship and involvement have driven MAP, and pilot projects are now in place using MAP versions 2.1 and 2.2. Full implementation systems are possible with version 3.0, a "production" version available in 1988. Enhanced performance architecture will help computer-intensive applications and minimap will provide greater speed and better response times in certain network configurations. But complete multi-level MAP protocols and standards are still three or four years away, at least.

A new General Motors study has shown that MAP-based systems are less expensive to install than those using proprietary protocols. In the study, a MAP system cost $3,000 per mode, compared with $2,664 per mode for proprietary systems. However, when software and training costs are added, MAP was 40% less expensive.

MAP is best suited for environments which are characterized by:

- complex manufacturing operations.
- multiple systems utilization.
- data input received from computer sensors and counters on the assembly line.
- multiple vendors' software/hardware in use.
- MRP II is installed to meet present or future competition.

Forty percent of manufacturing companies responding to a recent survey indicated they expect MAP to be affordable and viable in 1990.

Like CIM, MAP must be considered a multi-year process, not an event. Both vendors and users must understand this.

From a vendor standpoint, MAP will require a major commitment, but sitting on the sidelines and waiting may result in a serious competitive risk. Vendors who are not serious about CIM should not start on MAP.

Several vendors have moved aggressively to position themselves for MAP implementation as an industry standard:

- Connectivity for MAP/TOP protocols is offered by DEC, IBM, Sun and other equipment manufacturers.

- EDS will emerge as a major participant, because of their role as GM's systems integrator for MAP.

- Sytek offers broadband networks, a necessity for MAP systems.

- General Electric has introduced GE NET.

- Concord Data Systems is assisting EDS in the GM implementation.

- Allen-Bradley introduced its Data Highway.

D

Absorption

Absorption is currently a major issue, although it is not always recognized as such. Absorption, in this case, means that the rate of introduction and amount of product available has reached a point where it is well ahead of the user's ability to "absorb" or implement new products.

- Absorption applies directly in the software area and it partially accounts for the decline in the growth rate for software vendors.

- Absorption is not as much of a problem in the discrete manufacturing sector as in other sectors due to IS management's continuing insistence on customized solutions.

This phenomenon also is contributing to the lengthening of the decision cycle, since more products to evaluate result in absorbing more staff resources. To compound the problem, the rate of new product introductions has IS managers even more confused.

- Yet another factor contributing to these delays is the increasing complexity resulting from planning for integrated environments. This complexity will continue to cause delays in the decision process, but is also a professional services opportunity, to assist manufacturing firms in planning and implementing complex systems.

- This is very difficult for turnkey systems vendors, as their systems become more complex and the cost of sales goes up when the sales cycle stretches out.

While absorption may be fully appreciated by the user community, it is an issue that vendors should analyze carefully in terms of each of their market segments.

E

IBM's Position

As in other large markets, IBM is and will be a factor. IBM is the leading supplier of MRP II systems, in market share. In discrete manufacturing, IBM's strategy is expected to be similar to its general strategy, which is to maintain centralized systems. There are a few specific moves relative to manufacturing systems.

- IBM has slowly but surely put a short-term strategy in place. Included for the short term are products for computer-aided design, industrial robots, shop floor microcomputers, and specialized workstations. These products will be sold to the islands of automation, but will not connect them.
- IBM's longer term strategy is to tie these components together with an architecture based around data base management systems on the mainframe -- more of the same centralized structure that INPUT has predicted for IBM throughout the 1980s.
- Although IBM has announced MAPICS II implementation for the System 36 and the System 38, it does not appear this was for a departmental strategy, but rather for the low-end market.
- A clear indication of IBM's commitment to this market is the special business units (the same tactic used to launch the PC) established last year to address CAD and robotics.

IBM recently launched their Applications Systems Division, with several thousand employees dedicated to improving IBM's position in industry-specific software markets. If IBM chooses to address discrete manufacturing, as is likely, they will make a significant impact.

IBM can be expected to follow the overall strategy predicted by INPUT in the late seventies. This strategy consists of introducing, in the early 1990s, decentralized architectures to address office automation and departmental computing. In the meantime, IBM will participate and confuse the market where and when necessary in order to fend off any perceived competitive threats.

Despite IBM's commitment, they may not be the lead vendor in implementing complex manufacturing systems in the late 1980s and 1990s. These systems will involve multiple subcontractors and somewhere a lead "contractor" or system integrator will emerge.

F

MRP II: A Crowded Market

MRP II systems are now offered by over 300 vendors, many of them using micro-based systems. There are only 2,000 U.S. firms large enough to spend $1-2 million for mainframe-based systems, and this market segment is 70% saturated. At the high end, replacements and upgrades are the primary opportunity.

Penetration of small and mid-sized firms is more likely now, as declining costs bring these systems into affordable ranges. Price declines are likely to be spurred by microprocessors. In 1985, the average MRP II purchase price was $375,000. By 1990 the price will be $250,000

EXHIBIT I-1

ISSUES AND IMPLICATIONS

AREA	ISSUE	IMPLICATIONS FOR I.S. VENDORS
Markets	• Declining share of world-wide markets • Major deficit in U.S. merchandise trade balance • Heavy competition from "lower-cost" foreign firms	• Increased interest in improving production efficiencies
	• Need for company-wide automation strategies	• More rapid obsolescence of older automated systems • More frequent company-wide systems contracts with vendors • Systems integration approach
	• Need for increased inter-departmental planning and coordination	• Need for more education and training services • Professional services opportunities

EXHIBIT I-2

ISSUES AND IMPLICATIONS
(Cont.)

AREA	ISSUE	IMPLICATIONS FOR I.S. VENDORS
Production	• Interest in "just-in-time" manufacturing - Reduced inventory - Flexible set-up - Improved material handling - Instant Communication	• Less complex MRP II planning units • Relational DBMS and group technology • Improved automatic storage and retrieval systems • Physical linkage of shop floor and engineering systems via telecommunications • Factory floor LANs + office LANs • Standardization of network protocols (e.g., MAP) • Need for electronic information interchanges between suppliers, manufacturers, and dealers.

II

Market Analysis and Forecast

II

Market Analysis and Forecast

INPUT has segregated the discrete manufacturing industry sector as follows:

Manufacturing Planning and Control Systems (MPCS)

- Customer order processing
- Sales forecasting
- Capacity planning
- Master production scheduling
- Material requirements planning (MRP)
- Manufacturing resource planning (MRP II)
- Bill of materials processor
- Inventory management/control/JiT
- Product costing/routing
- Job costing/labor control
- Shop floor control
- Manufacturing standards/costing/engineering
- Purchasing

Design and Fabrication Systems

- Computer-Aided Design (CAD)
- Computer-Aided Engineering (CAE)
- Computer-Aided Manufacturing (CAM)
- Computer-Aided Manufacturing Maintenance (CAMM)
- Numerical Control Machines
- Robotics

Professional Services

- Consulting, education, training, support, software customization, systems integration.

Based on this segmentation, INPUT developed the following forecast data.

A
Total Industry-Specific Spending

The overall performance of the discrete manufacturing sector is expected to grow 21% in 1987, from $5.2 billion in 1986 to $6.4 billion in 1987.

The outlook for continued growth is at a slightly lower rate, 16%, during the 1987-1992 period. Revenues will reach $13.5 billion in 1992, as shown in Exhibit II-1.

Professional services growth is projected at 21%, reflecting the complexity of implementing CIM, MAP, MRP II, and CAD/CAE systems. Significant investment is required in consulting, training, planning, software customization and systems integration to install many of these systems.

By 1992, professional services revenues will equal combined revenues from processing services, applications software, and turnkey systems. Even 1986 professional services generated more revenue than any single product delivery mode category.

Processing Services (remote computing, batch processing, and facilities management) will grow at a 12% rate from $785 million in 1987 to $1.4 billion in 1992.

Applications software is the fastest growing product segment, at 17%, from $1.2 billion in 1987 to $2.5 billion in 1992. Within applications software, microprocessor software growth is 25%; mainframe/mini software grows at a 15% rate, reflecting the high-end market saturation described earlier. Exhibit II-2 shows this data graphically.

Turnkey systems are also subject to the saturation factor, as well as declining equipment costs. Turnkey systems generated $1.9 billion in 1987, and will grow at 10%, to $3.0 billion in 1992. Turnkey systems are, and will remain the product delivery mode producing the largest revenues.

EXHIBIT II-1

DISCRETE MANUFACTURING SECTOR TOTAL USER EXPENDITURES, 1987-1992

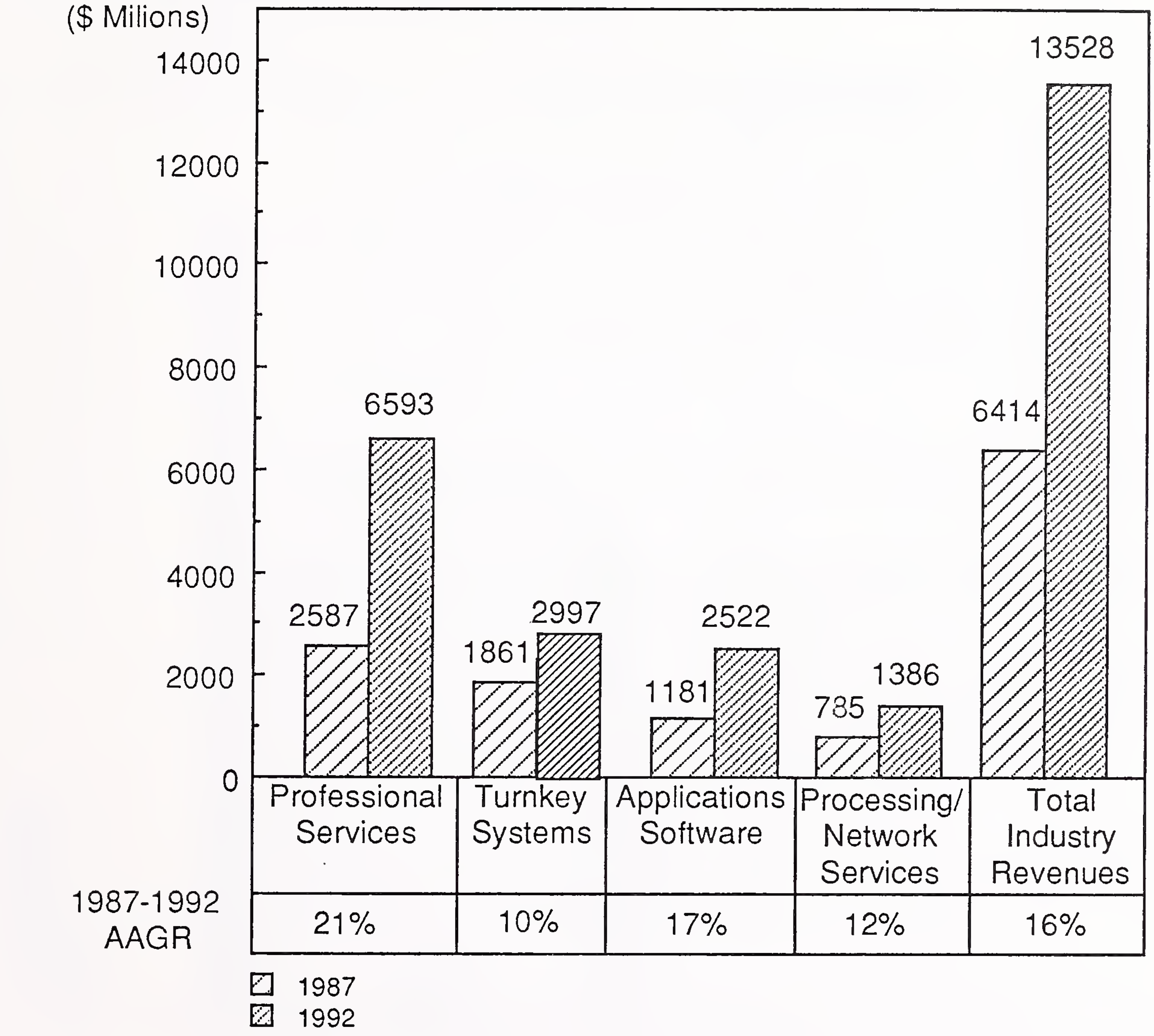
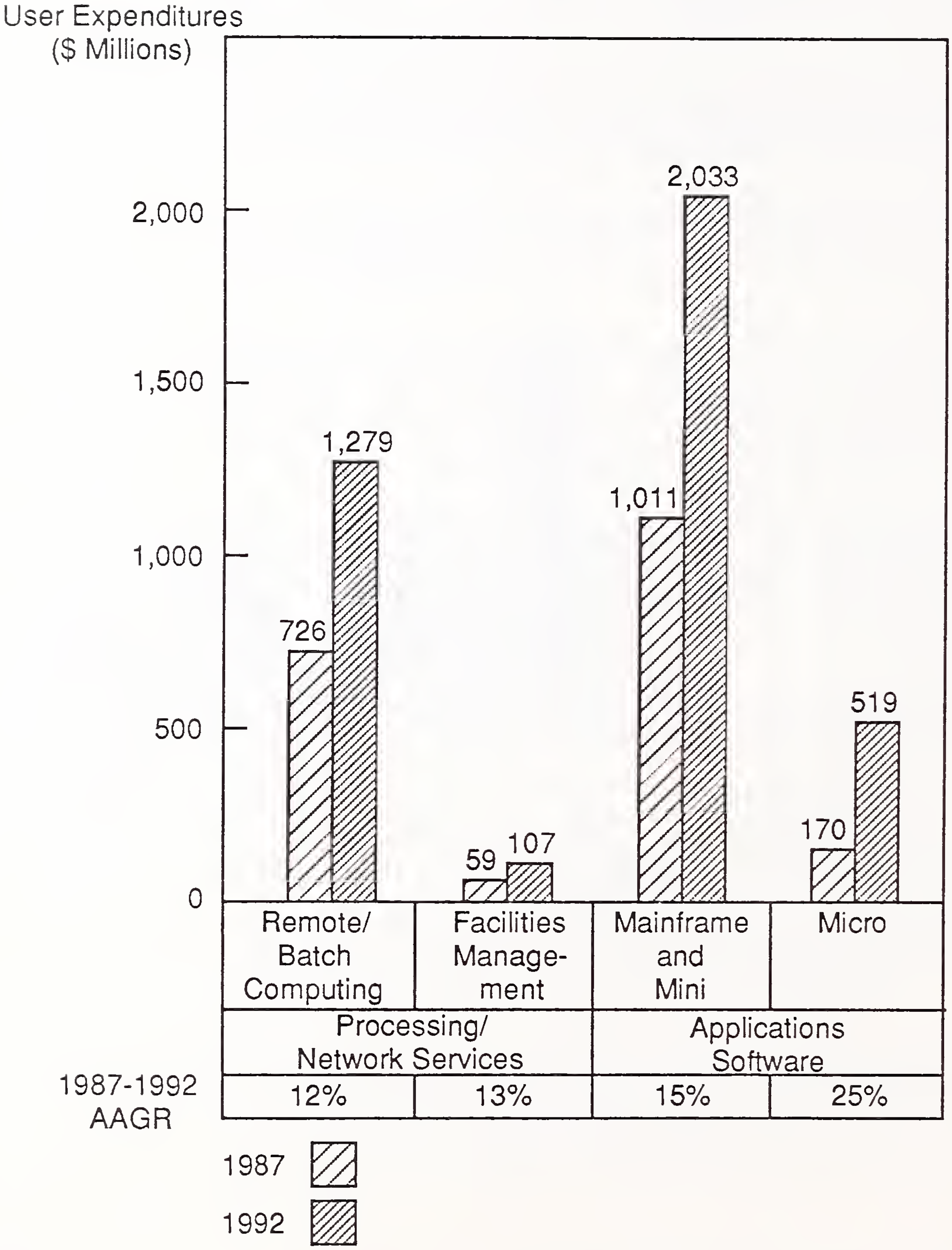


EXHIBIT II-2

DISCRETE MANUFACTURING SECTOR USER EXPENDITURES BY DELIVERY MODE, 1987-1992



B

Product-Specific Expenditures

1. Manufacturing Planning and Control Systems (MPCS)

MPCS markets have reached a mature state, and will grow at a 10% rate during 1987-1992, from $1.7 billion to $2.7 billion, as shown in Exhibit II-3.

There are over 268,000 manufacturing companies in the U.S., but only 2,000 can afford CIM and MAP-type fully-integrated systems. As many as 230,000 of these firms are potential candidates to implement microprocessor-based MRP II systems. Only 5% of these companies are currently using MRP II; by 1990 as many as 50% may be. This is a net increase of more than 100,000 MRP installations. Most of these will be standalone systems, not tied to mainframes, at least at first. Potential for EDI and MAP connectivity will be high in the mid-1990s when these systems begin to mature.

There are over 200 micro-based MRP II vendors now in the market. A shake-out seems likely.

Market share of MRP II sites is dominated by IBM, followed by MSA/ Comserv, Martin Marietta, ASK/NCA, and Cullinet.

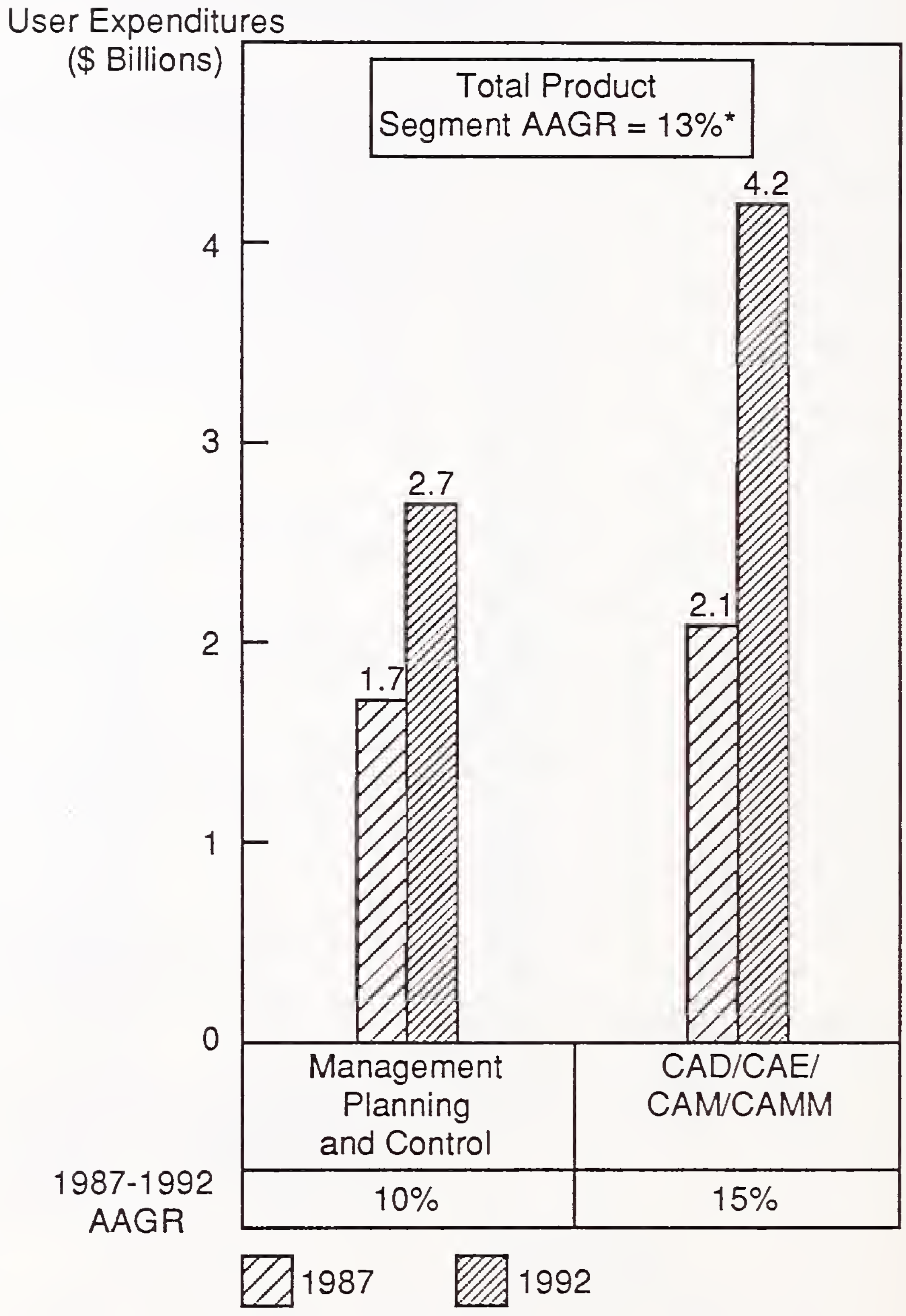
In the mid-range IBM Systems 36/38 market, IBM has captured 38% of the business with MAPICS and MAPICS II. These are typically purchased by first time users, who may upgrade later.

Worldwide, there are more than 29,000 MRP sites. IBM and the "first tier" ten major suppliers have over 60% of this market. Exhibit II-4 reflects market share of MRP II installations in the U.S.

MRP II has recently been criticized by the Defense Contracting Administration Agency (DCAA) as being not reliable for government contracting costing and payment purposes. The controversy is still unresolved, but may complicate matters for software vendors selling to the aerospace industry.

EXHIBIT II-3

DISCRETE MANUFACTURING SECTOR USER EXPENDITURES FORECAST BY PRODUCT-SPECIFIC CATEGORIES

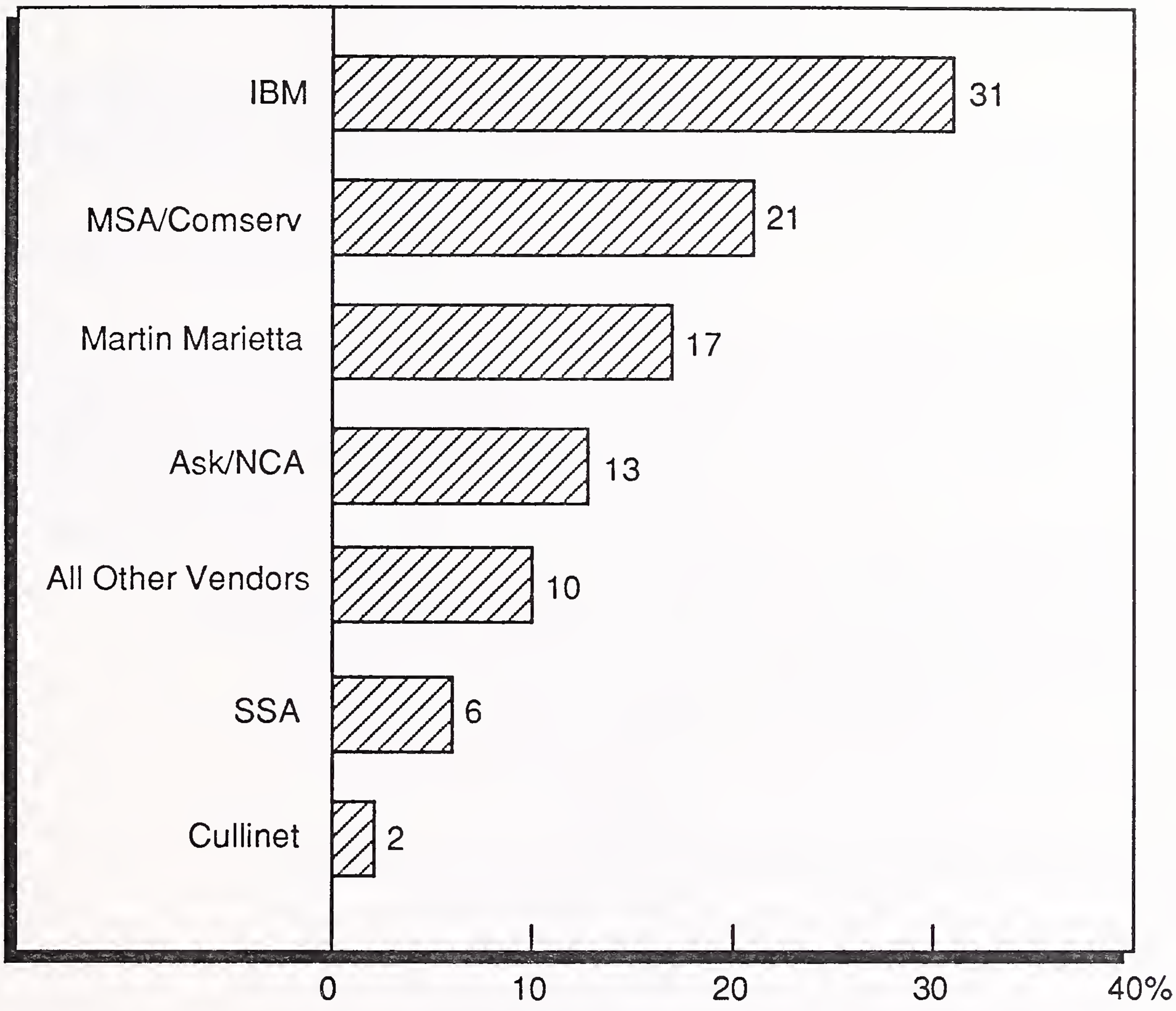


*Without Professional Services.

EXHIBIT II-4

MARKET SHARE: U.S. MRP II SITES

(Percent)



2. CAD/CAE/CAM

Automated design and fabrication operations are less mature markets than MPCS, and are growing more rapidly. With a forecast 15% growth rate, these systems will produce $2.1 billion in 1987, doubling to $4.2 billion in 1992.

Aerospace manufacturing companies are the largest users of this technology. While $49 million was spent on aerospace CAD/CAE/CAM activity during 1984, this will grow to $300 million by 1989.

Electronics and transportation manufacturing firms are also investing heavily in these technologies.

CAD/CAE/CAM systems are often delivered as standalone workstations, although mainframe-oriented systems are still abundant. Major vendors such as Sun, Digital, Intergraph, and Hewlett-Packard are investing in more powerful workstations, some with Reduced Instruction Set Computing Architecture (RISC) to improve their competitiveness.

Leading suppliers in this sector include:

- IBM
- Computervision
- Intergraph
- Applicon
- Auto-trol
- McDonnell Douglas
- Gerber Scientific
- Calma
- Autodesk

OEM deliveries of CAD/CAE/CAM systems are common. Workstations from Apollo and Sun have leading equipment positions, coupled with applications software from OEMs and VARs. Today, software represents about 30% of the price of a turnkey workstation. By 1992, declining equipment prices and greater software complexity will raise that figure to 50%.

Microprocessor-based systems are entering the market, and competition is heavy. These low-cost systems directly contributed to lost market share at Computervision and Auto-trol, and a number of start-up companies have been closed after failing to achieve sufficient market penetration to insure profitability.

A key competitive factor will be the ability to integrate data and graphics from CAD/CAE workstations with shop floor computers, and shorten lead times between design and production. Vendors who are able to demonstrate and perform this integration will have a marketing advantage over those who cannot.

Another trend is broader distribution of CAD/CAE functions. Rather than be tied to a single workstation, newer, more powerful systems can support a number of separate "seats" at technical workstations, tied together in a network.

Flexible manufacturing systems (FMS) are able to manage as many as eight numerically controlled machine tools from a single location. These are mainly provided by machine tool companies and sold into the metalworking industry.

Most user investments in these systems, as much as 75%, are a part of a desire to reduce labor costs. This will be an increasingly difficult task, because U.S.-produced goods now have a direct labor content of only 10-15% of their overall cost. Attention must be paid to indirect labor, materials cost, transportation, and distribution costs as well.

3. Professional Services

The fastest-growing segment in information systems for discrete manufacturers is professional services. From $2.6 billion spent in 1987, this segment grows to $6.6 billion in 1992, a 21% growth rate. At that level, professional services is as large as the combined revenues from processing/network services, application software, and turnkey systems.

The opportunities in professional services are created by the complexity of the systems needed and an industry preference for customized systems. The classic "systems integrator" role is one that can be performed effectively for many larger manufacturers.

Arthur Andersen, with its large staff of professional consultants, has assumed a leading role; there is ample room for many other participants. Arthur Andersen's presence is complicated, and also enhanced, by the fact that it sells an MRP II system (MAC PAC) as well as offers consulting services. This makes Arthur Andersen unique among the “Big 8” and other major consulting companies. There are now over 200 MAC PAC installations in the U.S.

Tandem Computers has formed alliances with Arthur Young and Coopers and Lybrand in delivering manufacturing systems and services.

Vendors who are positioned to assume a leading consulting role in this industry, beside Arthur Andersen and the other “Big 8” accounting firms, include EDS, Computer Task Group, Systems Control, and Keane Associates.

Companies who have developed systems integration skills and experience while executing complex federal government contracts may also find their expertise can be translated to the discrete manufacturing sector. Many CIM and MAP projects of greater complexity are likely to be conducted using the same systems integration philosophy.

III

Competitive Developments

III

Competitive Developments

A

Market Structure

The market share of selected leading vendors is shown in Exhibit III-1. Since some organizations are not willing to release revenue data by industry sector, the list is not complete, but is representative.

1. Manufacturing Planning and Control Systems (MPCS)

IBM is the dominant vendor, in delivering MAPICS II and COPICS (applications solutions).

Software products as a delivery mode has attracted the most vendors. This is due partially to user demand and partially to vendor assessments of the market. Systems software vendors like Cullinet and Cincom are seeking to leverage their presence in these markets by launching applications software based on their tools, while others like MSA leverage their experience with other applications software products. MSA has further strengthened its role through the acquisition of Comserv.

Processing/network services leaders are McDonnell Douglas Information Systems Group, Boeing Computer Services, GEISCO, and Xerox Computer Services.

ASK is the turnkey systems leader, and has improved its position with the recent acquisition of NCA.

Large hardware manufacturers IBM, DEC, Unisys, Hewlett-Packard and others, will provide competition, but are primarily interested in leveraging sales of their equipment. Information services vendors should consider and pursue strategic alliances with these firms, especially for large opportunities.

EXHIBIT III-1

MARKET SHARE OF INFORMATION SERVICES VENDORS DISCRETE MANUFACTURING SECTOR, 1987

VENDOR NAME	1987 REVENUES ($ Millions, U.S. Sales)					
	Processing & Network Services	Applications Software Products	Turnkey Systems	Profes-sional Services	Total	Share of Market (Percent)
IBM	12	310	-	-	322	5.0
McDonnell Douglas I.S.	10	-	160	10	180	2.8
Calma	-	25	110	-	135	2.1
Arthur Anderson	-	60	-	66	126	4.0
Computervision	-	30	60	30	120	1.9
Gerber	-	-	115	-	115	1.8
ASK (& NCA)	10	15	82	3	110	1.7
Applicon	18	9	72	-	99	1.5
Boeing Computer Services	90	-	-	-	90	1.4
Control Data Corp.	-	-	62	-	62	1.0
MSA (& Comserv)	-	38	-	15	53	0.8
Intergraph	-	-	50	-	50	0.8
EDS	25	-	20	-	45	0.7
Cullinet	-	45	-	-	45	0.7
GEISCO	42	-	-	-	42	0.7
Xerox Computer Services	20	10	10	-	40	0.6
American Software	-	27	-	9	36	0.6
Martin Marietta D.S.	14	8	-	-	22	0.3
DEC	-	20	-	-	20	0.3
Dun & Bradstreet (Must Software)	-	20	-	-	20	0.3
Systems Software Assoc.	-	21	-	-	21	0.3
Cincom	-	16	-	-	16	0.2
Hewlett-Packard	-	16	-	-	16	0.2
Autodesk	-	-	10	-	10	0.2
Keane, Inc.	-	-	-	10	10	0.2
Sub-Total	241 (31%)	670 (57%)	751 (40%)	143 (6%)	1805 (28%)	
All Other Vendors	544	511	1110	2444	4609	
Total Market	785	1181	1861	2587	6414	

Systems integration, long a practice in federal government procurement activity, is a discipline whose time has come as a procurement strategy for complex systems in discrete manufacturing.

While IBM does have a significant position in this sector, INPUT believes IBM's current strategy of centralizing information processing on large host computers provides a window of opportunity for competitors.

- Manufacturing is currently one of the more decentralized industry sectors, and it appears firms are willing to continue to embrace decentralized solutions.

- INPUT further believes that IBM will not move aggressively into decentralized systems, based on the premise that the manufacturing sector will not find adequate solutions from competitors in the near term.

The strong showing of the turnkey vendors in the market is evidence of the "islands of automation." These vendors are predominantly suppliers of CAD/CAM systems and are expected to maintain their presence and, through alliances such as GE Calma, be able to expand in the emerging CIM market.

2. CAD/CAM/CAE

The size and growth of the CAD/CAM/CAE market has attracted many vendors. However, it is not as fragmented as the manufacturing control segment. The participants can be grouped in the following four categories:

- Hardware (processors, digitizers, plotters, interface boards, controllers, and other peripherals) from vendors like IBM, DEC, HP, Tektronix, CDC, Perkin-Elmer, Apollo, and Sun Microsystems.

- Software (graphics operating systems, image processing, animation, and application-specific products) from Applicon, Cadam, Grafcon, and others.

- Turnkey systems (complete hardware and software applications systems for design, layout, and other applications) from Auto-trol, Intergraph, ComputerVision, GE Calma, IBM, and others.

- Processing/network services (application-specific service products) from McDonnell Douglas, CompuServe, CDC, Dun & Bradstreet, and others.

The highly structured nature of CAD/CAM/CAE applications creates the necessity for structured applications highly focused on the end-user requirement, thus making room for vendors who truly understand the market at a detailed application level.

The supermicro and, to a lesser extent, micro-based products are creating confusion in this segment due to the very low price systems these products allow.

The CAD and CAM areas are still growth markets, but the emphasis for the future will be integrating CAD and CAM with other systems including:

- Programmable controllers.
- Shop floor control.
- Quality control.
- Planning.
- Numerical control.

The CAMM application system involves computer-based analysis and scheduling of maintenance. This is a most valuable tool and is primarily used for scheduling preventive maintenance. The next step is predictive maintenance that allows the system to analyze the machines and predict when failures are about to occur.

The CAMM system consists of three major components:

- Machine and production monitoring.
- Maintenance dispatch.
- Preventive maintenance.

B

Profiles of Thirteen Leading Competitors

1. IBM

a. Products/Services

MAPICS, COPICS, many third-party applications. COPICS is in use in 500 mainframe sites; over 10,000 MAPICS installations dominate the System 36/38 market, with a 38% market share.

b. Markets Served

Discrete manufacturing companies using IBM mid-range and large systems. Also, IBM's personal computers will be used extensively to extend market reach and depth.

c. Company Strategy

IBM's strength centers around the widespread use of its hardware combined with the strength of its name recognition and support capabilities. In addition, IBM has the additional advantage of being able to integrate hardware and software at the point of sale. IBM can price software low in order to promote hardware sales while still being able to support continued product improvements with lower R&D costs as a percentage of total sales.

IBM's commitment to application software is demonstrated by its formation of the Applications Systems Division, with several thousand employees dedicated to the production and marketing of vertical market software, for specific, still unidentified large niche markets.

d. Recent Activities

IBM has not made public any significant activity in the areas of computer-integrated manufacturing (CIM) or in the integration of its traditional manufacturing software with CAD/CAM applications. However, IBM is moving behind the scenes in efforts like licensing AML, a manufacturing language, to machine tool vendors such as Cincinnati Milacron.

IBM's current compensation plan strongly urges its sales people to sell MAPICS software along with System 36/38 computers. This is a change from prior plans.

e. Future Directions

IBM will move quickly to increase penetration of this sector in order to expand its presence now and leverage that presence in development of the CIM market. IBM will use its control of the corporate data base to gain control of factory systems through a "data integrity" strategy.

2. DEC

a. Products/Services

VMCS, FDCM, PMCS.

b. Markets Served

Large discrete manufacturing companies using VAX-11 and PDP-11 with RSX-11 and VMS operating systems.

c. Company Strategy

Like IBM, DEC's strength is based on widespread use of their hardware, especially in industrial environments. DEC has been very strong in manufacturing, communications and government applications. DEC has a worldwide software support and training operation and provides services in 47 countries.

d. Recent Activities

DEC has been emphasizing relationships with third-party application developers as well as developing new OEMs with machine tool and automated materials handling vendors such as GE/FANUC.

e. Future Directions

DEC will seek to develop allies in the non-computer technology segments and to leverage its existing strengths on the factory floor and with OEMs. DEC will also seek alliances with potential large-scale systems integrators.

3. Cullinet

a. Products /Services

Cullinet Manufacturing System.

b. Markets Served

Medium to large discrete and process manufacturing firms using IBM and plug-compatible mainframes and DEC VAX mini-based systems.

c. Company Strategy

Cullinet entered the manufacturing software market in 1980 by purchasing a manufacturing system from Rath and Strong. Prior to 1981, Cullinet (then known as Cullinane Data Base Systems) made a name for itself in data base development. Cullinet stresses the advantages of its MRP II software offering, utilizing the highly regarded IDMS/R relational data base. While competitors tend to point out Cullinet's relative inexperience in manufacturing, Cullinet counters that a truly integrated manufacturing solution revolves around the data base and that its competitors' MRP II products utilize revamped 1970s technology in data base design. As a result, Cullinet tends to attract IS managers who like Cullinet's reputation, particularly in the area of data base design.

d. Recent Activities

A recent shakeup at Cullinet reflects a desire to strengthen its image in manufacturing. Cullinet brought in former Data General executive David Chapman as Vice Chairman and Chief Executive Officer, prompting President Robert N. Goldman (one of Cullinet's original ten employees) to resign. Chapman's last position with Data General was Senior Vice President for manufacturing, and this move should signal increased attention to technological development into the manufacturing processes.

Cullinet will push its 4GL solution, (ADS/0), tied to its IDMS/R relational data base.

Cullinet ranks high in industry surveys, due to well-satisfied customers.

Cullinet recently released its "Repetition" closed loop software, for volume-oriented production/inventory control applications.

C-TRAK is an MRP II system for government contractors to report to the federal government.

e. Future Directions

After 21 consecutive quarters of growth in the 50% range, Cullinet slumped in 1986 and 1987. Cullinet is apparently recognizing the stagnancy of the cross-industry market and instead will concentrate on enhancing its manufacturing software. Specifically, Cullinet will increase activity in the areas of repetitive manufacturing processes and in integration of CAD/CAM and CIM applications.

4. ASK Computer Systems, Inc.

a. Products/Services

MANMAN Information System, available as a turnkey system, as a software package, or as RCS processing services.

b. Markets Served

Discrete and process manufacturing firms. Smaller companies (less than $10 million) are targeted with the RCS offering. Larger companies ($10 - $200 million) that currently have DEC VAX or HP 3000 systems are targeted with the software offering. ASK recently cancelled plans to offer a package for IBM 4300 small mainframes.

c. Company Strategy

After targeting the HP 3000 market exclusively, MANMAN sales for VAX systems have equalled MANMAN/3000 (for HP 3000 systems) in 1987. With the Micro VAX II offering, ASK will compete for smaller ($1 - $10 million) manufacturers with such vendors as MDS Qantel.

d. Recent Activities

ASK has announced its intention to link MRP with automated test equipment and to develop a transaction-oriented data base management system. Its acquisition of NCA expands ASK's customer base by 50% to 2,000 users.

e. Future Directions

ASK/NCA will form a powerful marketing force, and secure ASK's position as a leader in the turnkey systems area.

5. Xerox Computer Services

a. Products/Services

Xerox Manufacturing System.

b. Markets Served

Discrete manufacturing companies with IBM 4300, 370, 303X, or 308X mainframe systems. Also, Xerox targets smaller, decentralized, and transitional manufacturing companies with its RCS manufacturing system. Xerox also markets a turnkey manufacturing product called the Xerox Business Management System (XBMS) for customers as small as $10 million in annual sales and a turnkey system for companies with revenues of $40 million and up called the Entry Turnkey System.

c. Company Strategy

In 1982 approximately 90% of XCS total computer service revenues were derived from processing services, with just under 10% from software products and only a fraction of a percentage coming from turnkey systems. Since then, the costs of acquiring computing power have come down to a level that has enabled many companies to bring processing inhouse. Software and turnkey sales, particularly in the manufacturing market, now account for over 30% of XCS' annual revenues and XCS has delivered XMS to more than 200 clients. While Xerox is certainly emphasizing manufacturing software sales, they are by no means abandoning their RCS business. XCS stresses the advantages of RCS processing for those large manufacturers with widely dispersed operating locations, due to XCS' networking expertise and the increased phone rates and difficulty in dealing with multiple phone companies since the breakup of AT&T. Other prime candidates for RCS manufacturing processing are startup companies who have not yet decided on their own data processing strategies. Thus, XCS steps in on an interim basis, providing both the industry-specific expertise and the data processing experience.

d. Recent Activities

The major share of recent developments by XCS is in the software area, specifically in introducing or improving specific modules for its integrated manufacturing software products. Within the last year, XCS has introduced a number of new modules, including a repetitive manufacturing module for its Xerox Business Management System. Xerox also expanded its CAD systems line by introducing its Xerox Professional Mechanical Systems, an Ethernet-linked LAN of workstations that share common data bases.

e. Future Directions

XCS has made public two specific goals for the future: first, to concentrate on accessing an enormous potential market of small- to medium-sized manufacturing companies and automating their factories' work floor; second, to place greater emphasis on moving toward computer-integrated manufacturing with much greater integration with CAD and MRP applications.

Further, XCS has targeted Cullinet as its chief competitor in the market and should continue to make improvements and enhancements in its own package to compete with Cullinet's Manufacturing System, particularly in the database management area.

6. EDS

a. Products/Services

Professional services and facilities management.

b. Markets Served

EDS' association as part of General Motors stimulated efforts to actively pursue improvement of the manufacturing process. EDS has been spearheading the efforts of American manufacturers to force hardware vendors to implement MAP on their systems. Now it has gone one step further by designing and testing MAP at GM's plants.

c. Company Strategy

While EDS is working to put MAP on the factory floor, it is also building the large, complex data bases needed to tie in suppliers and dealers. Building and maintaining complex, accurate data bases is one of EDS' major strengths and will provide the means to integrate all segments of the manufacturing process. The dealers are being given direct electronic data communications with GM's computers, which will greatly speed up order taking and production scheduling. EDS will have great potential for commercializing this manufacturing systems integration expertise once the company can show off a few automated GM factories.

d. Recent Activities

Besides manufacturing systems, EDS is building GM its own private communications network to expand communications capacity and reduce the cost of voice, video, graphics, and data exchange. This will provide new capabilities to enhance segments of the manufacturing information system.

7. MSA/Comserv

a. Products/Services

MSA has acquired Comserv, and now markets their AMAPS product line, a comprehensive set of closed-loop MRP II applications software products plus related shop floor control and CAD applications. MSA also offers its own MRP II software package.

b. Markets Served

MSA's MRP II system is targeted to very large ($100 million or more) discrete and process manufacturers using IBM mainframes. Comserv's products are complementary to MSA's, being targeted to manufacturing companies with at least $60 million in annual sales, using IBM mainframes, plus smaller and/or decentralized manufacturing firms using HP 3000 minicomputers. Comserv's AMAPS/G is targeted at manufacturing firms who pursue government contracts.

c. Company Strategy

MSA's acquisition of Comserv will accelerate MSA's penetration of the manufacturing systems market, which is a strategic objective for MSA.

MSA benefits from excellent name recognition and size, with a large user base and enough revenues available to sustain a successful sales and support force.

MSA has strongly endorsed IBM's DB2 as their standard data base management system.

d. Recent Activity

With the Comserv acquisition, MSA has over 3,000 installations in manufacturing companies.

MSA is moving to enter the mid-range market with IBM 36/38-based manufacturing software.

MSA has jointly conducted manufacturing seminars with Arthur Anderson.

e. Future Directions

MSA's fourth generation language, Information Expert, will be a vehicle for integrating and customizing manufacturing applications. These fully-integrated systems provide MSA with a vehicle for entry into the CIM arena.

8. Intergraph

a. Products/Services

CAD/CAE/CAM graphics and DBMS systems.

Prices range from $40,000 to $680,000.

b. Markets Served

Deliver turnkey systems based on Digital's M-VAX to 8600 systems; 2,300 systems are installed.

c. Recent Activity

Microprocessors are reducing prices of "per-seat" systems. Intergraph has taken advantage of this trend by introducing four workstation systems based on DEC microprocessor technology.

9. Boeing Computer Services

a. Products/Services

Production Management System (PMS), Maintenance and Materials Management (MMS).

b. Markets Served

Discrete and process manufacturing software for HP 3000 systems, IBM mainframes. Overall, BCS has 1,200 customers. Nearly 50% of revenue came from federal government contracts.

c. Company Strategy

Boeing is a well-recognized name, providing various forms of remote computing services, facilities management, and software products. Major industry markets are services to the federal government, engineering, and energy sectors. Future markets for BCS services will emphasize telecommunications, manufacturing, and distribution.

d. Recent Activities

Boeing Network Architecture (BNA) is Boeing's architecture for systems within which the Technical and Office Protocol (TOP) has been linked with products from the Manufacturing Automation Protocol (MAP). MAP was demonstrated in model form in November 1985 at the Autofact Conference.

e. Future Directions

Boeing will continue to develop capabilities in the manufacturing sector and will have the resources and technical know-how to be a major competitor. Boeing will expand its products and presence with leverage from manufacturing systems developed for Boeing aircraft design and manufacture.

10. Martin Marietta Data Systems (MMDS)

a. Products/Services

The MAS system incorporates master scheduling, inventory control, manufacturing engineering, purchasing control, cost generation, engineering control, cost management, material lot tracking.

b. Markets Served

Products are available as a remote processing service form MMDS' four data centers; as software products for IBM, DEC and HP computers; or as

DEC VAX turnkey systems. Services are provided in the United Kingdom through Hoskyns International. Over 700 customers utilize MMDS' MAS products.

c. Recent Activity

MMDS recently sold parts of its software business (RAMIS II and UFO) to Online Business Systems for $35 million.

d. Future Directions

MMDS is broadening its approach to information systems, looking to be more of a commercial systems integrator; it has already enjoyed some successes in this area. MMDS still supports its own MAS products, but is not reluctant to recommend other vendors' software as a part of a larger systems integration contract.

11. American Software

a. Products/Services

Application software packages for manufacturing companies. Sixteen software modules include: order processing, master scheduling, MRP II, bill of material, capacity planning, shop floor control, production status, route and work center maintenance, cost management and tracking, purchasing, and forecasting.

b. Markets Served

IBM mainframes and System 38. American Software has 520 customers, including 300 MRP installations.

c. Company Strategy

American Software has integrated its separate modules into a total manufacturing system. It expanded into the System 38 market in 1985.

12. Systems Software Associates (SSA)

a. Products/Services

MRP II software packages.

b. Markets Served

IBM System 36/38 installed base. SSA has 1,600 installations worldwide, second only to IBM in the System 36/38 market.

c. Company Strategy

Sales are made through a network of 43 affiliates, 25 in the U.S.

d. Recent Activity

SSA went public in 1987, and has used the proceeds to buy several of its affiliated companies (typically a systems software house) in Chicago, New England and Australia.

13. Cincom

a. Products/Services

Software products and services. Control/MFC includes MRP II, master production schedules, bill of materials, shop floor control, purchasing cost management and order entry. Prices vary from $21,000 to $85,000 per module.

b. Markets Served

Manufacturing installations with IBM 43XX, 30XX, DEC VAX systems.

c. Company Strategy

Cincom has committed itself to a major effort in the manufacturing systems market. Cincom currently serves more than 200 manufacturing installations.

Cincom will use its position as a vendor of systems/utility software to offer a broad system solution embedding operations and systems software. The Cincom-installed system software customer base within the manufacturing sector is a valuable prospect source.

IV

Information Systems Department Outlook

IV

Information Systems Department Outlook

Exhibit IV-1 shows the 1987 budget distribution and projects the 1988 budget growth for IS expenses. Distribution of expenses has not changed substantially from 1986. People, communications, software, mainframe, and micro costs are up as a percent of the total budget, but only by a single percent or less. Maintenance, minicomputer, external processing, and professional services are down a small percent each. Factors influencing budget growth include:

- Upgrading of technology and capacity.
- New CIM manufacturing and on-line end-user applications.
- Inflation.
- Government tracking and control requirements.

A ten percent increase in mainframe and micro systems hardware and software reflects corporations' realization that managing information is essential to business success and that this must be done with the best IS tools available.

Communications costs continue to grow as manufacturing, sales, support, and consumers are being brought on-line to improve productivity and profits. Factors influencing budget stabilization include:

- Expense management.
- Better hardware and software price/performance.
- Productivity improvements.

EXHIBIT IV-1

DISCRETE MANUFACTURING 1987 BUDGET DISTRIBUTION AND 1987/1988 CHANGES IN THE DISCRETE MANUFACTURING SECTOR

BUDGET CATEGORY	1987 PERCENT OF I.S. BUDGET (PERCENT)	1986/1987 EXPECTED BUDGET GROWTH (PERCENT)
Personnel Salaries and Fringes	46.0	6.0
Mainframe Processors	9.4	10.9
Minicomputers	3.7	6.2
Microcomputers	4.9	15.1
Mass Storage Devices	3.0	8.0
Other Hardware	3.6	3.5
Total Hardware	24.6	10.2
Data Communications	13.4	10.2
External Software	6.2	4.2
Professional Services	.5	(10.0)
Software Maintenance	2.2	3.0
Hardware Maintenance	4.6	8.8
Other	2.5	5.2
Total	100.0	7.6

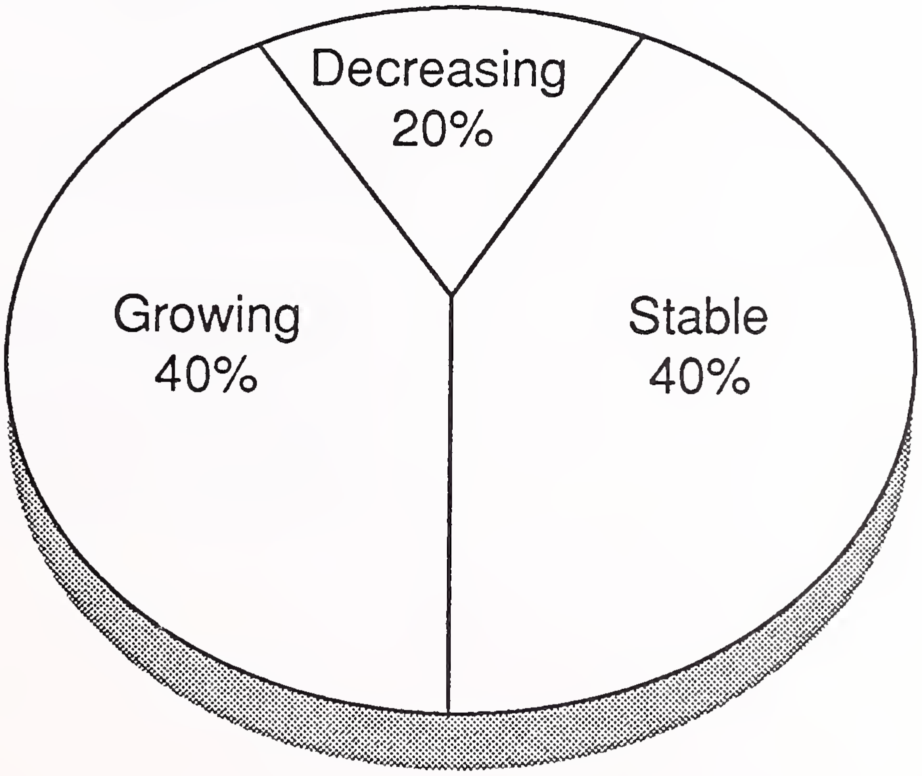
Factors influencing budget decreases include:

- Revenue decrease and related expense controls.
- Continued decrease in use of outside services and consultants. This reflects a determination to keep costs down and to be self-reliant.
- Data center consolidation.

Exhibit IV-2 shows the percent of respondents expecting their budget to grow, stabilize, or downsize in 1988. The financials continue to indicate a down turn in the manufacturing sector and a strong emphasis on expense and profit management. This is reflected in a consistent movement to integrate IS as a full partner in the management of the business and to justify and approve all IS work (new hardware and applications), primarily on an ROI basis.

EXHIBIT IV-2

DISCRETE MANUFACTURING
1987 BUDGET CHANGES
AS A PERCENT OF RESPONDENTS



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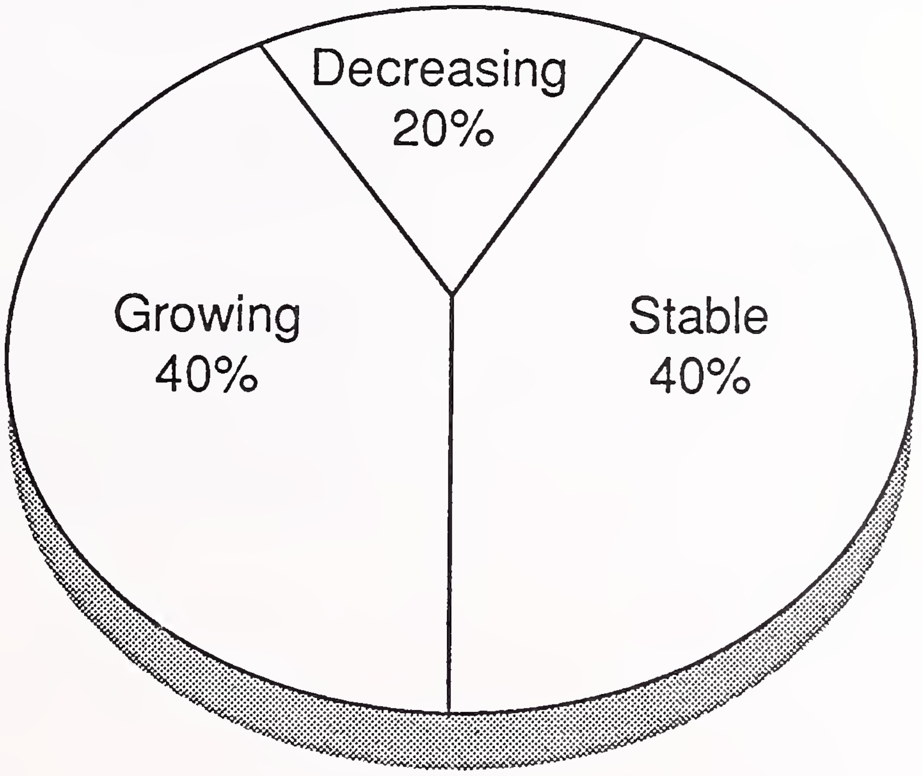

Forty percent expect to see budget growth in the 12 percent range. Factors influencing budget growth include:

- Increased investment in computer manufacturing-related IS hardware and software.

- Inflation.

- Increased business revenues.

- Upgrade in hardware technology and capacity.

- Investment in end-user and consumer applications.

- Government tracking and inventory management requirements.

- Personnel expense.

Twenty percent expect serious downsizing of the IS operation and budget. Factors influencing budget decreases include:

- Consolidation of IS centers.
- Poor revenue outlook.
- Expense control.

Forty percent expect their costs to remain at the same level as this year. This implies a real decrease in expenses as they all expected inflation to raise actual costs. Factors influencing budget stabilization include:

- Business revenues stable to decreasing.
- Consolidation of data centers.
- Improving hardware and software price/performance.
- Lower and seemingly stable inflation.
- Downsizing to stay profitable.

V

New Opportunities for Clients

V

New Opportunities for Clients

This section will discuss some of the opportunities for information services vendors.

Because of its size, the manufacturing market has long been attractive for computer software and services vendors. The current size of the information services segment is approaching $6.5 billion.

Many of the opportunities in this sector are well-understood and well-defined. Among these are the traditional segments including CAE, CAD/CAM, MRP II, and inventory management and control.

The following is a discussion of significant opportunities for INPUT clients.

A

Manufacturing Planning and Control Systems (MPCS)

There is a great deal of demand for linking these "back office" systems to other functional departments. Opportunities exist for network products, database systems, systems integration, and professional services.

There is also demand to replace the older planning/control systems with more up-to-date architectures that will allow connectivity. This is the real target for applications software developed around data base systems. This is also a potential foot in the door for participating in CIM.

Electronic data interchange (EDI) is expected to be a significant opportunity for processing/network services vendors.

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B

CAD/CAM/CAE

As in the manufacturing information systems area, there is an opportunity in the CAD/CAM/CAE segment to link independent systems together. In some instances this is an interface strategy; in others an integration approach is required.

Microprocessor-based CAD/CAM systems will be installed in increasing numbers as hardware prices fall and software becomes more feature-rich.

An emerging demand is in the area of computer-aided maintenance management (CAMM). This is a high-potential opportunity for both software and turnkey vendors to develop systems for analyzing and scheduling maintenance in the plant. The predictive maintenance function is a logical enhancement to complete offerings in this area.

C

Shop Floor Control

The opportunities in shop floor control tend to be greater for hardware-oriented vendors.

Because of this, information services vendors should consider joint venture relationships with hardware vendors who need applications software, installation support, and custom software development.

While opportunities seem to be available for turnkey vendors, there are associated risks due to the potential demand for customization of these highly complex processes.

D

MAP

Major systems built around and connected to MAP networks will begin coming online in the early 1990s. Vendors with MAP-compatible products will be able to participate fully in this major thrust toward CIM.

E

Computer-Integrated Manufacturing (CIM)

The moving target labeled CIM presents many opportunities supported by enormous demand that will attract the very large competitors. Most information services vendors should develop strategies to partner with these very large vendors.

- MAP implementations using systems integration (SI) is expected to be a very large market. The practice of using SI-type procurements has been employed successfully by the federal government for a number of years and would be a good model to emulate in the private sector. MAP activity will increase steadily over the next few years, as will the need for SI to support it.

- Expertise in any of the following CIM components would make an attractive potential partner for the strategy of teaming with one or more of the very large vendors.

    - Computer-aided design.
    - Group technology.
    - Manufacturing planning/control.
    - Automated handling systems.
    - Computer-aided manufacturing.
    - Industrial robots.
    - Processing/network integration.

Organizations possessing manufacturing systems expertise should consider leveraging these skills through professional services offerings. Since this industry displays a preference toward customization, programming services will continue to be in demand.

There are also corresponding opportunities with small- to medium-sized manufacturers where the competitive pressures may be less severe.

VI

Conclusions and Recommendations

VI

Conclusions and Recommendations

VI

Conclusions and Recommendations

The discrete manufacturing market will continue as a large and attractive opportunity for vendors of computer-based products and services. However, the market is expected to change frequently over the next few years as new applications and new solutions emerge. Manufacturing planning/control markets are replacement-oriented at the high end, and many competitors have entered the low-end microprocessor-based market. Price competition will continue to have an impact on all vendors. Some consolidation is expected.

Clients wishing to participate in the discrete manufacturing market should begin now by developing detailed long-range plans. These plans should include, as a minimum:

- Market segmentation and identification of specific segments by type of manufacturer, by functional target, by geographic area, and by the current competitive environment.
- A thorough competitive assessment completed in order to understand who to compete with and who to team with. Potential competitive advantages and disadvantages must be identified and understood by all levels within the organization.
- A complete staff analysis performed to determine the type of staff needed, the appropriate organization required, and the sources available for staffing to meet the plan.
- A technology assessment by vendors to predict both new technology impacts and the potential timing of competitive or new technology. This

evaluation should also include an analysis of technology needed to respond to competitive threats.

- Analysis by clients of the market for potential teaming alternatives. Candidates and their perceived strategies, strengths, and weaknesses should be identified and included in the plan by the gap that candidates would fill in executing the strategic plan.

Don't be greedy. This is a very large market with many multi-million dollar opportunities.

The manufacturing industry sector has had a history of propensity to build versus buy. Vendors should expect this attitude to continue to be prevalent. For software and turnkey vendors this means a strategy that includes the ability to customize the product. Such a decision must be a conscious, not opportunistic, one.

Professional services vendors should evaluate the system integration practice in the federal government. Large, complex systems such as those expected in the manufacturing industry could benefit from this approach. A creative, proactive thrust in system integration may be a winning strategy.

INPUT's analysis concludes there will be many opportunities for vendors to "waste their time" on big deals that will never happen or whose decision cycle will be continually extended. All sales activity should be carefully monitored to determine any patterns in these procurements in order to adequately plan and deploy the sales resource.

Sales campaigns should be structured around two central themes:

- Cost reduction (this sector must be competitive to survive).
- Time savings (translates to cost and the ability to respond to competition).

DM-A

Appendix: Definitions

DM-A

Appendix: Definitions

A

Manufacturing-Specific Definitions

Bill of Material (BOM) - A listing of all subassemblies, parts, and materials that go into an assembled part (showing the quantities of each).

CAD/CAM - The integrated applications of CAD and CAM.

Capacity Requirements Planning - The translation of open shop orders and planned shop orders into hours of work by time period and work center.

Computer-Aided Design (CAD) - Applications of computer and graphic technology to engineering, design, and drafting.

Computer-Aided Engineering (CAE) - Applications of computer and graphic technology to engineering, design, and drafting.

Computer-Aided Maintenance Management (CAMM) - Systems for analyzing and scheduling maintenance in manufacturing plants. The predictive maintenance function would be the next logical development.

Computer-Aided Manufacturing (CAM) - Application of computer and graphic technology to manufacturing, engineering, planning, and control.

Computer-Integrated Manufacturing (CIM) - Integration of separately automated factory functions. These functions include MRP II, CAD/CAM/CAE, DSS, process control, ATE, and robotics. CIM is very complex and should be considered as requiring management change to commit to the technology and philosophy.

Electronic Data/Document Interchange (EDI) - The use of a communications network to transmit and receive electronic business transactions between multiple locations on an intra- or inter-company basis.

Finite Element Analysis - As used in this report, includes all tasks involved in structural analysis using finite element methods–mesh generation, preprocessing, finite element analysis processing, and post-processing.

Group Technology - the application of classification and coding technology to search a data base for information on similar parts and to apply this to CAD and CAM tasks.

Manufacturing Resource Planning II - an extension of MRP, where MRP is integrated with financial planning, a simulation capability, and other functions on a closed-loop basis for the planning.

Master Production Schedule - An anticipated build schedule that drives the MRP systems.

Material Requirements Planning (MRP) - A system to calculate material requirements on a dynamic basis using inputs from BOM, inventory status, open order status, and master production schedules.

Nesting - Software to automatically or interactively arrange patterns for parts within stock material boundaries.

Numerical Control (NC) - CAM technology and systems for generating numerically-controlled machine tool programs.

Shipments - The dollar equivalent of products shipped by a manufacturing establishment. Will usually be approximately equal to annual revenue.

Shop Floor Control - Control of the progress of each customer order or stock order through the operations of its production cycle and the collection of data about actual completion results or status.

Value Added - The portion of product shipment values originating in that industry; includes factors such as labor costs, depreciation, various business expenses, and energy costs. It is basically the difference between shipments and raw or input materials costs.

B

Other Definitions

Database Management System (DBMS) - A software system that allows a user to structure a data base by defining the data, its organization, and the association between data elements. It also includes a data manipulation language (for accessing, sorting, merging, etc.) and controls for concurrent use (security, request, queuing, etc.) Functions as a common interface to multiple applications.

Distributed Data Base - A data base that is physically located at multiple sites, with each site having a part of the total data base. The sites are usually linked to a central site and have access to each other.

Distributed Processing - Multiple computers simultaneously processing elements of a CAD or CAM task.

Management Information System (MIS) - A data processing system specifically designed to provide business managers with company, financial, project, or program data.

Networking - The interconnection and control of remotely located systems and devices over communications lines.

Electronic Data/Document Interchange (EDI) - The use of a communications network to transmit and receive electronic business transactions between multiple locations on an intra- or inter-company basis.

Finite Element Analysis - As used in this report, includes all tasks involved in structural analysis using finite element methods–mesh generation, preprocessing, finite element analysis processing, and post-processing.

Group Technology - the application of classification and coding technology to search a data base for information on similar parts and to apply this to CAD and CAM tasks.

Manufacturing Resource Planning II - an extension of MRP, where MRP is integrated with financial planning, a simulation capability, and other functions on a closed-loop basis for the planning.

Master Production Schedule - An anticipated build schedule that drives the MRP systems.

Material Requirements Planning (MRP) - A system to calculate material requirements on a dynamic basis using inputs from BOM, inventory status, open order status, and master production schedules.

Nesting - Software to automatically or interactively arrange patterns for parts within stock material boundaries.

Numerical Control (NC) - CAM technology and systems for generating numerically-controlled machine tool programs.

Shipments - The dollar equivalent of products shipped by a manufacturing establishment. Will usually be approximately equal to annual revenue.

Shop Floor Control - Control of the progress of each customer order or stock order through the operations of its production cycle and the collection of data about actual completion results or status.

Value Added - The portion of product shipment values originating in that industry; includes factors such as labor costs, depreciation, various business expenses, and energy costs. It is basically the difference between shipments and raw or input materials costs.

B

Other Definitions

Database Management System (DBMS) - A software system that allows a user to structure a data base by defining the data, its organization, and the association between data elements. It also includes a data manipulation language (for accessing, sorting, merging, etc.) and controls for concurrent use (security, request, queuing, etc.) Functions as a common interface to multiple applications.

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DM-B

Appendix: Forecast Data Base: Discrete Manufacturing Sector

DM-B

Appendix: Forecast Database: Discrete Manufacturing Sector

This appendix contains the following forecast information, as shown in Exhibits DM-B-1 and DM-B-2.

- Market size by delivery mode for each year, 1986-1992.
- Market growth rates for 1986-1987.
- Average annual growth rate (AAGR) for each delivery mode for the five-year period 1987-1992.
- Market size by product category for each year, 1986-1992.
  - Manufacturing Planning and Control Systems
  - CAD/CAE/CAM
- Market growth rates by product category.
- Average annual growth rate (AAGR) by product category, 1987-1992.

EXHIBIT B-1

DISCRETE MANUFACTURING INDUSTRY SECTOR INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986-1992

SEGMENTATION BY DELIVERY MODE	1986 ($M)	1986-1987 Growth (%)	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)	AAGR 1987-1992 (%)
Processing/ Neworks Services									
Remote Computing/ Batch	631	15	726	828	935	1,047	1,163	1,279	12
Facility Management	52	13	59	67	75	85	96	107	13
Total Processing Services	683	15	785	895	1,010	1,132	1,259	1,386	12
Application Software									
Mainframe/Mini	857	18	1,011	1,183	1,372	1,578	1,799	2,033	15
Micro	98	73	170	255	332	398	458	519	25
Total Application Software	955	24	1,181	1,438	1,704	1,976	2,257	2,552	17
Turnkey Systems	1,662	12	1,861	2,066	2,272	2,499	2,749	2,997	10
Sector Product Total	3,300	16	3,827	4,399	4,986	5,607	6,265	6,935	13
Professional Services	1,988	30	2,587	3,138	3,790	4,468	5,417	6,593	21
Total	5,288	21	6,414	7,537	8,776	10,075	11,682	13,528	16

EXHIBI BI-2

DISCRETE MANUFACTURING INDUSTRY SECTOR INDUSTRY-SPECIFIC USER EXPENDITURES FORECASTS, 1986-1992 BY PRODUCT CATEGORY

PRODUCT CATEGORY	1986 ($M)	1986-1987 Growth	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)	AAGR 1987-1992 (%)
Manufacturing Planning and Control Systems (MPCS)	1,503	13	1,698	1,868	2,055	2,260	2,486	2,735	10
Design and Fabrication Systems (CAD/CAM/CAE/NC)	1,797	18	2,129	2,531	2,931	3,347	3,779	4,200	15
Product Total	3,300	16	3,827	4,399	4,986	5,607	6,265	6,935	13

About INPUT

INPUT provides planning information, analysis and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

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Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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U.S. INFORMATION SERVICES
INDUSTRY-SPECIFIC MARKETS, 1986-1991
WHOLESALE DISTRIBUTION SECTOR

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U.S. INFORMATION SERVICES
INDUSTRY-SPECIFIC MARKETS, 1986-1991
WHOLESALE DISTRIBUTION SECTOR

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U.S. INFORMATION SERVICES
INDUSTRY-SPECIFIC MARKETS, 1986-1991
WHOLESALE DISTRIBUTION SECTOR

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I SIZE AND GROWTH

- Total information services user expenditures in the wholesale distribution sector will reach some $900 million in 1987, representing a 17% growth rate from the 1986 figure of $767 million. This is roughly on a par with the industry as a whole. Size and growth forecasts for this sector from 1986 to 1991 are presented in Exhibit I-1.

- Within this sector, however, there will be marked differences in growth rates for different delivery modes.

    - Software product sales will lead, with an average annual growth rate of 26%--one of the highest for this delivery mode among all industry sectors. Microcomputer software will fare even better, enjoying a 30% compounded growth rate.

    - At the other end of the growth spectrum are processing services which are forecast to grow, on average, only 5% per year through 1991.

        - This would be higher were it not for the even lower growth rate, 3% per year, forecast for facilities management services.

        - When the effects of inflation are considered, this represents a negative real rate of growth.

EXHIBIT I-1

WHOLESALE DISTRIBUTION SECTOR FORECAST

SERVICE MODE	1986-1991 AAGR (Percent)	1991 User Expenditure Current Dollars ($ Millions)	1991 Size Rank	1986-1991 Growth Rank
Processing Services				
- Remote Computing/Batch	6%	$296	4	5
- Facility Management	3%	38	7	7
Total Processing Services	5%	$334	5	6
Application Software				
- Mainframe/Mini	24%	$541	3	3
- Micro	30%	216	6	1
Total Applications SW	26%	$757	1	2
Turnkey Systems	18%	$604	2	4
Grand Total	17%	$1,695	-	-

- The year 1986 was the first in which processing services did not dominate as the principal delivery mode for this industry sector. Mustering only a modest 7% growth rate from 1985 to 1986, processing services were outstripped by turnkey systems as the principal delivery mode for industry-specific services.

- Turnkey systems spending reached $269 million in 1986 with a 20% user expenditure growth over 1985.

- By 1988, turnkey systems will be surpassed by applications software as the delivery mode absorbing the greatest spending for industry-specific information services in the wholesale distribution sector.

II ISSUES, TRENDS, AND EVENTS

A. INTRODUCTION

- The wholesale distribution industry represents one of the most interesting and challenging targets for information services suppliers.

- Some of the most important challenges include addressing an industry where there exists:

  - A plethora of widely different submarkets such as industrial machinery, petroleum products, grocery and food products, hardware, automotive, toys, furniture, and a dozen other submarkets, many with different information services requirements.

  - Widely differing growth rates among industry subsectors.

  - Some very large wholesale distribution firms which are leading-edge implementers of computer technologies and many thousands of very small firms, many of which have only recently begun to implement information systems.

  - Some of the broadest technological and application challenges facing computer user of any industry in the economy.

- And, as the previous section indicated, while the industry affords ample opprotunity for revenue growth among certain delivery modes, for example sales of software products and turnkey systems, it presents a problem for vendors serving slowly growing segments or applications.

B. INDUSTRY STRUCTURE AND TRENDS

- The wholesale distribution industry consists of three types of firms:
  - Independent distributors, sometimes called merchant wholesalers, who contribute some 55-60% of total industry sales volumes. Their contribution to total industry sales is increasing.
  - Manufacturers' sales branches which generate some 35% of industry sales. Their portion of sales is in flux.
    - Foreign manufacturers targeting the U.S. marketplace could cause this portion to go up or down depending on whether they utilize existing distribution channels or opt for the more difficult and higher cost but longer term potentially more profitable establishment of their own distribution networks.
  - Independent agents and brokers which contribute roughly 10% of total industry volume. Their share is experiencing contraction.
- Market share is an important indicator of relative market strength as one percentage point represents approximately $4 billion in sales.
- Different submarkets are enjoying (or suffering) widely differential growth rates.

    - The drug, machinery, and hardware sectors are experiencing strong growth rates.

    - On the other hand, wholesalers in the food, petroleum, furniture, and most raw material sectors, impacted largely by deflationary forces in their respective markets, are suffering from poor or, in many cases, negative growth rates.

        - Poor performance in these industries is hurting distributors as customers stretch out payables, purchase in smaller quantities, pressure distributors for better terms, and sometimes (as was dramatically shown in this year's LTV bankruptcy case) pay at only a fraction on the dollar or not at all.

- The entire industry is beset by financial squeezes associated with:

    - Low inflation and a resulting inability to raise prices or pass along costs.

    - High real interest rates and their burden in carrying large inventories. The extent of the burden can be dramatic. Inventory can represent as much as 70% of the asset value of wholesale distributors. Inventory carrying costs sometimes reach 40% of distributors' expenses.

- Almost 90% of the expense of doing business in this industry is associated with three activities--inventory financing, warehousing, and transportation.

- Overall, the industry's profit margins are quite low (typically 2-3%), so pressures to improve efficiency and profitability are strong.

- Some of the most important economic pressures facing the industry are summarized in Exhibit II-1.

EXHIBIT II-1

ECONOMIC ISSUES AFFECTING WHOLESALE DISTRIBUTION AND IMPLICATIONS FOR INFORMATION SERVICES SUPPLIES

DISTRIBUTION INDUSTRY SECTOR	ISSUES	OPERATIONAL IMPLICATIONS
All Subtractors	Continued Low Inflation Difficult to Pass on Costs	Profitability Lost Containment
Food, Petroleum, Furniture, Raw Materials	Actual Deflation Contraction Consolidation	Tightened Cash Receivables and Inventory Mgt.
Drugs, Hardware, Apparel, Printing	Sectional Growth	Acquisition Analysis Capacity Planning Distribution
Electrical Goods, Machinery, Motor Vehicles	ForeignCompetition in Source Industries	Product Line Expansion Increased Competition

- These economic pressures have driven many wholesalers to specialize their market focuses so as to:

  - Increase the turnover of (and hence the return on) any given inventory item.

  - Secure from suppliers the advantages of higher volume purchases.

  - Obtain longer purchase commitments from customers or commitments for larger quantities.

- As a result, all wholesalers have increased their attention to financial analysis and management. This attention should be reflected in vendors' product offerings.

- The wholesale distribution industry is very splintered in terms of the size of the firms participating, as shown in Exhibit II-2.

- Fewer than 2% of the firms in the industry generate almost 50% of the total sales. Their businesses typically span multiple sites, and they may even participate in multiple subsectors of the larger distribution business.

  - One large southwest wholesale distributor with revenues approaching $200 million operates in 40 locations and addresses 10 distinct markets including electrical equipment, industrial machinery, and robotics. It has recently added a division to address factory automation needs and is extending its services to include design and installation consulting for factory automation systems.

  - Product and market diversification and geographic expansion will be important strategic activities for these firms over the next five years. Communications will be a leading application for these firms. They will need to integrate dispersed operations into single logical

EXHIBIT II-2

REVENUE CONCENTRATION IN INDEPENDENT WHOLESALE DISTRIBUTION ESTABLISHMENTS

ANNUAL SALES 1985 ($ Millions)	NUMBER OF ESTABLISHMENTS	PERCENT OF ESTABLISHMENTS	PERCENT OF SALES
< $5,000	298,000	88.7%	27
$5 - 25,000	33,000	9.7%	27
> $25,000	5,400	1.6%	46

reporting and even operational units while extending services into customer premises with customer site inquiry and order entry terminals, design and engineering assistance, etc.

  - A combination of factors including declining hardware costs, link-ups with retail chains, and specialized requirements have led many of these firms to install sophisticated information processing systems in-house, frequently replacing outside processing services.

  - Large firms are the most active in pushing new information processing technologies such as electronic data interchange (EDI), forward integration to include point-of-sale (POS) systems, automated warehouses, etc. These firms are the principal markets for applications software sales for mainframe and minicomputer systems.

- At the other end of the spectrum, some 300,000 firms (87% of the industry's business units) earn less than $5 million a year in revenue, contributing only 27% of the industry's total sales. Most carry only very specialized lines and serve only local urban markets. This stratum will experience substantial consolidation in the next five years as the firms are unable to match larger wholesalers in such competitive areas as price, selection, delivery, value-added support services, purchase terms, etc.

- Many undercapitalized firms are now falling victims to softness in their customers' industries and the resultant stretch-out in receivables. One survey by a national distributor's association indicated that 30% of these firms had received acquisition offers within the past year.

  - Many of these "Mom and Pop" distributors have implemented only the most primitive automation or information systems.

    - These smaller firms are the largest buying segment in the wholesale distribution industry of microcomputer software and micro-based turnkey systems. They will continue to purchase large numbers of such systems over the next five years.

    . However, given the relatively low and declining prices and resultant pressures on profit margins from the sale of such systems, vendors should look at distribution strategies that either sell and install through existing sales and support networks or that involve third-party value-added resellers (VARs).

- Between these two extremes of company types are some 30,000 wholesale distributors earning between $5 and $25 million per year. These companies are more likely than their smaller counterparts to possess the diversification and the financial and management wherewithal to survive contractions in customer industries and competitive pressures in their own.

  - Aggressive computerization is forecast for this stratum as companies automate warehouse operations, order processing, inventory management, purchasing, receivables collections, and sales tracking and forecasting.

  - Automation is less a strategic thrust for these companies than it is a matter of survival in meeting the cost and competitive pressures in their environment. Medium-sized firms form the backbone of the aggressive growth forecasts in turnkey systems sales, systems typically based on business-oriented minicomputers such as IBM's System 34/36/38.

- Wholesale distributors are being confronted by a dizzying array of new technologies and applications, all of which hold the potential for assisting in cost containment, service level maintenance or enhancement, and strengthening of competitive position.

- Among the most important computer and communications technologies emerging in this industry are:
  - Point of sale (POS) and the forward integration of data collection into retail channels.
  - Electronic data interchange (EDI), now aimed at reducing labor costs associated with copious data entry and re-entry requirements of order processing. Soon EDI will be extended to support automatic payment transfers among suppliers, wholesalers, and retailers.
  - Software integration to make data collected from one part of the business available to aid analysis and reporting in others. Examples include:
    - Inventory stock status being available to customers for inquiry.
    - Sales data being used to develop profiles for targeting new markets or customers.
    - Communications, typically between dispersed offices or warehouses or between customer sites and warehouses.
    - Expert systems.
- Exhibit II-3 summarizes some of these technological issues and the challenges they pose to IS departments and vendor sales.

EXHIBIT II-3

TECHNOLOGICAL ISSUES AFFECTING WHOLESALE DISTRIBUTION

TECHNOLOGY	RATIONAL	CHALLENGES
POS	Data Capture Leads to: - Customer Analysis - Sales Modeling/ Forecasting	Forward Integration of Data Collection How Much Data to Capture, Analysis
EDI	Cost Reduction in Order Processing	Software Communications Standards
Software Integration	More Efficient Use of Data	Tower of Babel Syndrome Resources
Expert Systems	Inventory Cost Minimization Delivery Optimization	Cost of Implementation Least Computerized Industry Function

III APPLICATION ANALYSIS

- The classic "bedrock essential" applications of the wholesale industry include inventory management, purchasing, order processing, accounts receivable, accounts payable, expense reporting, and sales forecasting. These functions are usually offered on even the smallest systems, including PCs.

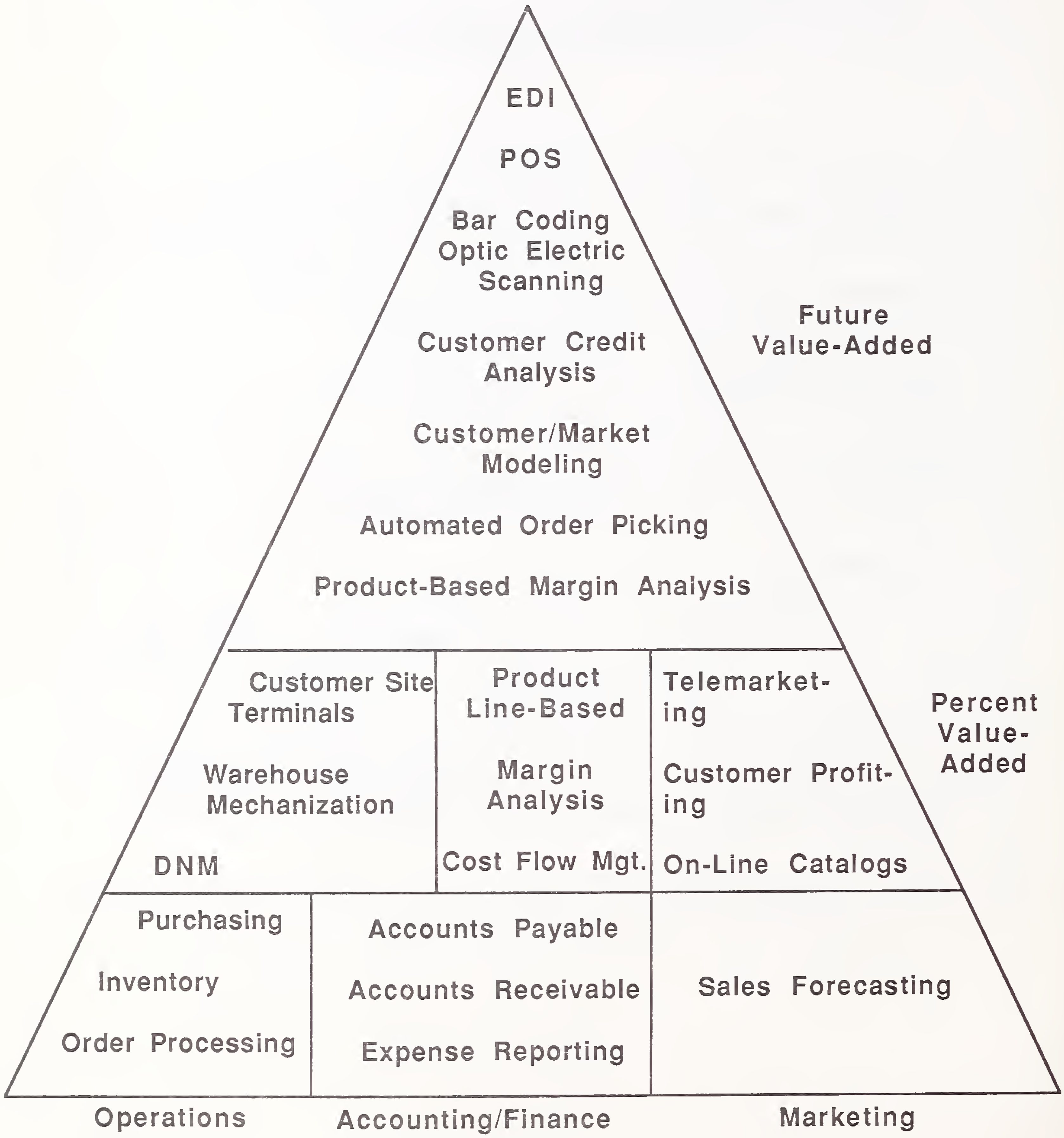
- As wholesalers grow in size, their applications requirements evolve to focus less on transaction-based processing and more on management reporting applications. This is especially true as firms expand to new markets and product lines, as the number and stocks of inventoried items increase, and as pressures grow to boost financial performance through improved inventory mangement.

    - At the high end, the most sophisticated wholesalers are implementing programs to dynamically model inventory stocks, economic order quantities (EOQ), customer, product line and market profitability, and delivery routing. Exhibit III-1 displays this evolution toward higher value-added applications as users' size and sophistication increases.

- Some of the applications cited by users as among the most important for them over the next two to five years are discussed below.

EXHIBIT III-1

EVOLUTION TOWARD HIGHER VALUE-ADDED APPLICATIONS IN THE WHOLESALE DISTRIBUTION INDUSTRY


EDI
POS
Bar Coding Optic Electric Scanning
Customer Credit Analysis
Customer/Market Modeling
Automated Order Picking
Product-Based Margin Analysis
Future Value-Added
Customer Site Terminals
Warehouse Mechanization
DNM
Product Line-Based Margin Analysis
Cost Flow Mgt.
Telemarketing
Customer Profiting
On-Line Catalogs
Percent Value-Added
Purchasing
Inventory
Order Processing
Accounts Payable
Accounts Receivable
Expense Reporting
Sales Forecasting
Operations
Accounting/Finance
Marketing

A. ELECTRONIC DOCUMENT INTERCHANGE

- Electronic document interchange poses one of the most far-reaching challenges to the wholesale distribution industry of any existing technology.

- Its implementation to date has been retarded by several factors such as:

  - The fractured nature of the industry with many small, independent wholesalers.

  - The lack of system software and communication standards (though use of the ANSI X12 standard is emerging in this area).

  - The unwillingness or inability of many participants to devote the resources necessary to implement EDI.

- Though implementation is still largely a promise, several factors indicate that it will emerge in a major way within the next five years:

  - The potential for cost reduction is enormous simply through reducing labor requirements for data re-entry and thereby eliminating errors caused by rekeying. Users have estimated potential cost reduction in these areas of as much as 70%.

  - Definition, implementation, and enforcement of a standard would be a major strategic advantage for a large manufacturer, wholesaler, or chain which was able to gain early adherence, participants, and momentum.

    - The reservation systems of United and American airlines pose analogous cases. They have proven of enormous strategic value to both companies.

        - ATM networks in banking have also been used to similar effect.

    - It is possible, though less likely, that a major systems vendor might attempt to establish a standard for order, receipt, or manifest interchange. IBM's effort several years ago in the insurance field is suggestive.

- Overall, EDI applications will grow from a small base at an average annual rate of over 100% for each of the next five years.

B. DISTRIBUTION RESOURCE PLANNING

- Distribution resource planning (DRP) grew out of manufacturing resource planning technologies in the late 1970s.

- DRP programs automate purchasing, storage and retrieval and utilize sales forecasts to determine the size and frequency of inventory replenishments.

    - It is used by warehouse personnel to prevent inventory stock-outs and overages and to minimize inventory carried by finance to predict cash flow requirements and perform margin analyses by product lines or products and by marketing to streamline customer deliveries and plan product promotions, introductions, etc.

    - It can serve as a "cradle-to-grave" tracking system for monitoring parts flows from manufacturers through to retail shelf.

- Users are experimenting with rule-driven programs resembling expert systems which predict optimum reorder times and quantities, taking advantage of discounts for volume purchases, prompt payments, etc.

- Such systems reduce warehousing, inventory carrying, and transportation costs, the major cost components for this industry.

C. DISTRIBUTION NETWORK MANAGEMENT

- Distribution network management is an application originally developed within the transportation industry to optimize the costs of delivering diverse types of freight to many locations over several possible modes.
  - It grew out of linear programming concepts and originally required large hardware, software, and staff commitments.
- Recently, it has been married to DRP to add a transportation component to overall operating cost planning and analysis.
- It is winning increasing acceptance in the wholesale distribution industry for modeling such variables as:
  - Delivery routes and alternatives.
  - Fleet and equipment requirements.
  - Cargoes.
  - Delivery frequencies.
  - Multilocation inventory stocks.
  - Backhaul opportunities.
  - Freight budgets.

- Some users have reported increases in vehicle fill rates of as much as 50%.

- Applications are being interfaced to fleet maintenance programs that peform vehicle repair frequency evaluation, cost analysis, and equipment amortization scheduling.

- The objectives are financial analyses and operations models aimed at increasing services (e.g., delivery frequency) while holding constant or reducing costs (e.g., delivery, inventory holding).

D. OTHERS

- Users noted several other important applications which they intended to begin implementing over the next two years:

    - Dynamic inventory modeling.

    - Bar code reading.

    - Sales forecasting.

    - Telemarketing.

    - Point of sale.

    - Communications.

IV I.S. BUDGETS

- Information systems budgets are approximately 0.7% of revenue in the wholesale distribution industry. This is close to the average for all industries.

- Forty percent of the companies in the wholesale distribution sector expect information systems budgets to increase in 1987. Another 40% expect their budgets to remain the same. Twenty percent expect IS budget decreases.

- The average budget growth expected for 1987 is 2.7%. In 1985, the sector's average IS budgets increased 5.4%.

- Exhibit IV-1 shows the distribution of expenses in the wholesale distribution IS budgets.

EXHIBIT IV-1

WHOLESALE DISTRIBUTION
1986 BUDGET DISTRIBUTION

BUDGET CATEGORY	1986 I.S. BUDGET (Percent)
Personnel	44.5%
Mainframe	18.4%
Mini	4.4%
Micro	7.5%
Other Hardware	1.1%
Total Hardware	31.4%
Communications	6.5%
PFS/SW Development	1.0%
Applications Software	4.2%
Systems Software	2.5%
Hardware Maintenance	4.3%
Software Maintenance	3.4%
Other	2.2%
Total	100.0%

V VENDOR PROFILES

A. MSA

I. PRODUCTS AND SERVICES

- Management Science America (Atlanta, GA) sells the Expert Series line of software which includes financial management software for a variety of industries including wholesale distribution.

- Specific modules for wholesale distribution include:

  - Order processing.

  - Purchasing.

  - Sales forecasting.

- In the first half of 1986, MSA released Information Expert, a set of software integration tools that allow each module in its distribution product line to access data from any other module.

2. COMPANY DIRECTIONS

- MSA is known for its strong off-the-shelf product orientation rather than for providing service and modifications for individual clients. The introduction of Information Expert can be seen as a continuation of this direction, providing tools to customers so that they can do their own ad hoc customization, reporting, and analyses.

- The company made a number of acquisitions in 1986, including ComServe, Information Associates, Inc. (Rochester, NY), and RTS, Ltd., of Dublin, Ireland. ComServe is a leading supplier of MRP software to the process and discrete manufacturing sectors. The other two firms specialize in providing IBM minicomputer (S/36/38)-based applications and provide a stronger presence by MSA in markets with smaller distribution firms. The company's stated goal of "verticalizing" many of its horizontal products for sales in specific industry markets also points to this direction.

B. AMERICAN SOFTWARE

1. PRODUCTS AND SERVICES

- American Software, headquartered in Atlanta, provides distribution software for wholesalers and for the distribution activities of discrete manufacturers.

- It offers a rich suite of modules covering all facets of wholesale distribution management including:

  - Demand forecasting.

  - Inventory planning.

- Distribution requirements planning (DRP).
- Customer order processing.
- Purchasing.
- Vehicle scheduling and loading.

- It also offers an Inventory Planning Facility program that allows customers to do simulation and modeling of their inventory stocks and flows.

- The company also offers professional services aimed at helping customers integrate American Software's products with their existing software program and data files.

2. COMPANY DIRECTIONS

- American Software has traditionally targeted Fortune 1000 manufacturers and distributors but has indicated signs of expanding its target markets to include smaller wholesalers.
    - Last year it introduced DRP/39, a DRP module for IBM's System 38 line of minicomputers.
    - They have acquired and codeveloped Accounts Receivable and Order Processing programs for the System 38 in conjunction with Pru Tech Research and Development Partnership.
    - It has also begun to introduce programs to run on IBM's System 36 line of minicomputers.

- In 1985, the company introduced AMSOFT DRP-PC, a program to support PC interfaces to its mainframe DRP systems.

C. MCBA

1. PRODUCTS AND SERVICES

- MCBA is located in Glendale (CA). It addresses the wholesale distribution marketplace with mini and microcomputer applications for accounting and distribution management.

- Its primary product for distributors includes ten modules covering the traditional areas of Order Entry, Purchasing, Inventory Management, and Sales Forecasting, as well as accounting functions such as Accounts Payable, Accounts Receivable, and General Ledger.

- It also supports Payroll, Customer List, and Fixed Asset and Depreciation reporting.

- The package serves small- to medium-sized distributors with mini and micro-computer systems.

2. COMPANY DIRECTIONS

- MCBA's strategy includes servicing the widest possible cross-section of whole-salers. It does this in two principal ways:

  - Making its products available on the most popular systems including minicomputers from Hewlett Packard, Wang, Texas Instruments, AT&T, DEC, and the IBM AT.

  - Providing a product which can be used without customization but which can be modified by the customer should they desire to fit their specific needs.

- Approximately 20% of MCBA's business comes from the wholesale distribution industry.

D. GSI TRANSCOMM

- GSI Transcomm produces TOLAS, a line of applications software for distribution and financial analysis. It is also available as a turnkey system on DEC or Tandem hardware.

- Modules, which range in price from $5,000 to $26,000, include:

  - Inquiry and reporting system.

  - Order entry/invoicing.

  - Inventory management and analysis.

  - Sales analysis.

  - Warehouse management.

  - Accounting/financial automation and analysis.

- A new product, Telestream, is an AI-based telemarketing system.

- The company is involved with The Carnegie Group of Pitsburgh (PA) in a project to integrate artificial intelligence techniques into TOLAS modules.

- Backo produces a line of software modules for warehouses and wholesale distributors. Prices range from $10,000 to $50,000.

- Its products address the needs of wholesalers with multiple warehouses who are automating their warehousing and distribution operations.

- Its basic product includes the most common distributor applications and is able to be modified by the customer.

- The company's fiscal year 1985 revenues are in the $1-5 million range and were up 150% over the previous year.

E. OTHER VENDORS

- Several vendors have staked out territories delivering software and turnkey systems products to different segments of the wholesale distribution marketplace.

    - Sentinel Computer Corporation of Cincinatti (OH) markets an IBM PC/AT-based turnkey system targeted at wholesalers with multiple offices and warehouses. The package, called Profit Control, supports up to nine users with the esential distributor applications as well as payroll and sales analysis.

    - Prophet 21, Inc. of Yardley (PA) sells a proprietary hardware and software package specifically targeted at the small wholesale distributor.

        - The system, called Foresee, includes more than 100 integrated software modules, four interactive terminals, and a printer. The basic model lists for $25,000.

        - The company markets through a network of 50 value-added resellers and dealers. It recently opened five offices around the country to provide local training and sales support to resellers and end users.

  - The company's 1985 sales totaled $20 million.

- CRT Distribution Systems, Inc., Waukesha (WI), provides a modular, interactive turnkey system based on IBM System 34 or 36 hardware. The system supports customer site terminals for remote stock status inquiry, pricing, or order entry. Also included are telemarketing programs and bar code reading hardware and software.

APPENDIX WH-A: DISTRIBUTION INDUSTRY SECTOR SERVICES MARKET FORECAST

- Exhibit WH-A-1 covers the five-year forecast of the entire distribution sector for information services markets, with the exception of professional services and systems software (both of which are provided in the cross-industry forecasts).

- Exhibit WH-A-2 covers the same five-year forecast for wholesale alone (the difference between WH-A-1 and WH-A-2 being the retail industry).

EXHIBIT WH-A-1

DISTRIBUTION INDUSTRY SECTOR INDUSTRY-SPECIFIC SERVICES MARKET, 1986-1991

Segmentation By Delivery Mode	1985 ($ M)	85-86 Growth	1986 ($ M)	1987 ($ M)	1988 ($ M)	1989 ($ M)	1990 ($ M)	1991 ($ M)	AAGR 86-91
PROCESSING SERVICES									
Remote Comp./ Batch	$773	14%	$883	$1,015	$1,185	$1,396	$1,592	$1,767	15%
Facility Mgt.	48	6%	51	54	58	62	68	73	7%
Total Processing Services	$821	7%	$934	$1,069	$1,243	$1,458	$1,660	$1,840	15%
APPLICATIONS SOFTWARE									
Mainframe/ Mini	$215	29%	$277	$357	$461	$595	$767	$902	27%
Micro	77	38%	106	148	205	272	358	464	34%
Total Applications Software	$292	31%	$383	$505	$666	$867	$1,125	$1,366	29%
TURNKEY SYSTEMS	$415	25%	$564	$703	$865	$1,009	$1,146	$1,294	18%
Total	$1,528	20%	$1,881	$2,277	$2,774	$3,334	$3,931	$4,500	19%

EXHIBIT WH-A-2

WHOLESALE INDUSTRY SECTOR INDUSTRY-SPECIFIC SERVICES MARKET, 1986-1991

Segmentation By Delivery Mode	1985 ($ M)	85-86 Growth	1986 ($ M)	1987 ($ M)	1988 ($ M)	1989 ($ M)	1990 ($ M)	1991 ($ M)	AAGR 86-91
PROCESSING SERVICES									
Remote Comp./ Batch	$209	7%	$224	$239	$253	$269	$282	$296	6%
Facility Mgt.	32	3%	33	34	35	36	37	38	3%
Total Processing Services	$241	7%	$257	$273	$288	$305	$319	$334	5%
APPLICATION SOFTWARE									
Mainframe/ Mini	$143	27%	$182	$228	$289	$364	$459	$541	24%
Micro	45	31%	59	77	100	130	168	216	30%
Total Application Software	$188	28%	$241	$305	$389	$494	$627	$757	26%
TURNKEY SYSTEMS	$224	20%	$269	$323	$381	$449	$521	$604	18%
Total	$653	17%	$767	$901	$1,058	$1,248	$1,467	$1,695	17%

About INPUT

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I

Issues, Trends, and Events

I

Issues, Trends, and Events

A

Introduction

The education market is divided into three major segments:

- Administrative applications.
- Academic/research applications.
- Library applications.

Public primary and secondary schools, as well as colleges and universities, which are faced with declining enrollments and reduced federal support, are experiencing severe financial constraints. The limited funds available for computers will be balanced by the need for improved information for marketing at higher education institutions and improved asset management at all schools.

Academic software is sold to different purchasers than administrative software. Purchasing cycles for off-the-shelf administrative applications typically last between 11 and 18 months. Purchasing cycles for micro-based academic software are much shorter.

Networking is a bona-fide trend at all educational institutions. Colleges and universities want to link entire campuses; primary and secondary schools want to connect microcomputers via local-area networks. IS managers have moved from the evaluation stage to planning and budgeting for local-area networks (LANs). 1988 may be the year that the educational computing community finally arrives at the LAN. With a network, the cost of peripherals can be spread over many computers, benefiting schools with tight budgets for computer equipment.

Microcomputer-based software is proliferating, with more publishers becoming involved in curriculum-based software, resulting in better quality software provided by large, well-financed vendors for IS departments. Full-line software and text book suppliers will make the purchase decision easier.

As more microcomputers are used in education, hardware service and software support will become increasingly important. Since IS managers cannot support a $100 or $200 software package in a cost-effective manner, vendor software support will be an important buying criterion.

Administrative software modules must be integrated; one keystroke should transfer the data entered to all system modules requiring that information. Dividing a large application into smaller modules also breaks a high-dollar-value scale into a series of smaller ticket sales, easing pressure on IS managers to build complete functionality overnight on a limited budget.

IS managers must look to recentralize control of micros. Someone outside the end-user department must monitor the purchase and use of micros.

To build market acceptance and encourage brand loyalty, microcomputer vendors have donated to schools approximately 15% of the PCs in use today. However, inexpensive software has not been developed at a pace matching the spread of microcomputer hardware.

Software preview centers are springing up across the country. There are about 750 centers across the U.S. helping schools and teachers sort through the myriad varieties of educational software on the market. Preview centers are usually part of a state institution or college and are designed to determine a list of approved products for purchase.

B

Definitions

Definitions used in the education market include specific terms for describing the grade level of pupils, namely:

- Primary school—kindergarten through grade five.
- Middle school—grades six through eight.
- Secondary school—grades nine through twelve.
- Post secondary—vocational school, two-year college, four-year college, four-year university, specialized professional school, technical institute.

Administrative computing applications encompass student scheduling, instructor scheduling, classroom scheduling, attendance monitoring and reporting, tuition, personnel administration, admission, alumni information, registration, alumni and corporate development, financial aid administration, accounting, investments, covenants and appeals, reports for state and federal agencies, work/study program administration, fellowship/internship accounting, student records, immunization tracking, grade reporting, aggregate test score evaluation, redistricting analysis, vehicle maintenance, ticketing for athletic and art/music events, and guidance counseling.

Academic/research computing modules address student instruction, test scoring, student test score interpretation, and professor- or department-specific research projects.

Library computerization software includes catalog maintenance and information retrieval, circulation control, loans and reservations, acquisitions, periodical control, indexing, text search and retrieval, financial management, overdue and reserve book handling, interbranch and interlibrary loan, and tracking periodicals being bound.

C

Trends in Primary and Secondary Schools

The current major trend is the move away from literacy to curriculum-based software. Computers are being used as tools for specific applications, such as art, music, and the "three Rs."

IBM microcomputers do not dominate the education market. In fact, the market leader is Apple, followed by Tandy/Radio Shack, and Commodore. Apple, Tandy/Radio Shack, and Commodore are successful due to:

- Strong discounts and equipment donations to schools.
- Availability of relatively high-quality software.

IBM micros, even with education market discounts, remained too expensive for budget-conscious schools.

More computer-based administrative systems for elementary and secondary schools are being made available through lower cost multiuser microcomputers and low-end minicomputers. School districts and individual schools can have in-house, cost-effective systems for administrative recordkeeping. As a result, use of processing/network services will decrease.

The availability of lower-priced hardware is not leading to proportionately higher sales of software due to the support costs associated with software for the education market. As the price of microcomputers declines, buyers expect the price of software to decline. This expectation is based on the ratio of software to hardware prices. It will be a challenge for software vendors to write and support high-quality courseware and meet the buyer's expectations for lower software prices. Relatively inexpensive, full-function, integrated software modules will appear as one solution to balance buyers' pricing expectations with the need for higher quality software.

Secondary schools are likewise using computers for such specific vocational applications as spreadsheets, information filing, and word processing. Other applications include biology/chemistry/social studies simulations, familiarity with the typewriter keyboard, English composition, process analysis, developing problem-solving techniques, and programming.

D

Trends in Post-Secondary Institutions

As a result of demographics, competition among post-secondary schools has intensified for a decreasing number of college-age students.

- Most four-year colleges and universities must now adopt marketing techniques in order to attract good students and faculty. Post-secondary institutions are using data bases to merge software, lists of prospective students, demographic SAT/ACH test scores, athlete names, and sports to target prospective students. Other software helps follow up on letters and phone calls with students.

- The increasing competition for top students is not limited to the best colleges and universities; rather, this trend affects all institutions of higher learning.

Since many four-year colleges and universities are funded partly by state taxes and federal grants, and since reporting requirements have increased at all levels of government, more budget and financial software is required.

Since businesses prefer to hire graduates with some degree of computer literacy, colleges and universities are trying to broaden student exposure to computers beyond engineering and business administration graduates. However, the key impediments to widespread adoption are interrelated—not knowing how to effectively utilize computers in say, philosophy, and a lack of discipline-specific instructional software. Little is being done to address this opportunity.

In partnership with local businesses, two-year colleges and vocational schools are increasing the variety, content, and depth of vocational education courses, offering courses to train employees in the use of spreadsheets, data base management, and word processing programs.

A recent trend on college campuses is the use of programs developed by faculty members. These programs are often called courseware because they are used to teach specific courses and subjects. Many new programs are sophisticated simulation programs that allow students to visualize on a computer phenomena that would be difficult or expensive to experience outside the classroom. For example, chemistry students can mix chemicals without risk of explosion, physics students can see the path that electrons travel in response to different forces, and medical students can perform simulated operations.

E

Trends in Computerization of Academic Libraries

Libraries are doing significantly more with computers, specifically:

- More libraries (academic, public, and specialized) are going on-line. Key applications include card catalogs and on-line data bases.
- Data base providers are designing easier access methods—including common software interfaces and easier-to-understand commands—to more data bases.
- More data bases, especially those that are industry or application specific as well as non-U.S. data bases, are constantly being added or upgraded through regional or national library consortia.

An industry leader, On-Line Computer Library Center (OCLC) has specified the Unix operating system in certain on-line applications. With the transportability of Unix files, OCLC lessens its dependence on computer hardware using proprietary operating systems.

OCLC research projects include:

- Easier access to electronic catalogs by patrons.
- Reducing overlap between abstracting and indexing services and central library computer files.
- Improvements to on-line Dewey Decimal System classifications and subject categories.
- On-line access to complete text and graphics in books.
- CD-ROM Retrieval System.
- Analyzing use of nonfiction books and current updates to catalogs of library holdings.

F

Factors Spurring Growth

Education textbook publishers now recognize the importance of "courseware" for microcomputers. Courseware comprises integrated software and workbooks for specific classroom modules. Improved courseware will accelerate the growth of application software for microcomputers.

Funding problems come and go as local politicians change and as parental (voter) pressure changes. The 1980s "baby boom" is likely to result in increased demands for better education since a greater proportion of these parents are college educated.

Despite more computer-literate instructors and administrators, the need for service and support continues to grow. Vendors should treat the requirement for increased support as an opportunity to "lock in" the buyer and sell additional products.

G

Factors Limiting Growth

Factors that have held back growth in the classroom educational software market include:

- Low levels of instructor computer literacy.
- Educational software that is limited in effectiveness.
- Limited financial resources of educational institutions.
- Lack of hardware standards to spur software development.

The growth of software sales has been limited also because of instructors' widespread "swapping" and "sharing" of software programs, which in some cases involve unauthorized copying. This practice limits the size of the market and, hence, limits the development efforts of software houses, which are concerned about making a profitable return on their investment. The pricing of software for the classroom will need to be changed in order to accommodate the interests of instructors and vendors. Some variation of corporate or site licensing programs may be appropriate for the education market segment.

II

Market Forecasts

II

Market Forecasts

A Introduction

The education market is diverse. The information requirements for administrative computing at colleges and universities is different from that at junior and senior high schools. Furthermore, community libraries differ from academic, professional, or industry-specific research libraries. User expenditures for industry-specific educational applications will grow 10% annually through 1992, increasing from $361 million in 1987 to $590 million in 1992, as shown in Exhibit II-1.

Forecasts for user expenditures by delivery mode are shown in Exhibit II-2. Application software will grow most rapidly, at a rate of 15%. Exhibit ED-A contains the forecast data base for each year between 1986 and 1992, by delivery mode.

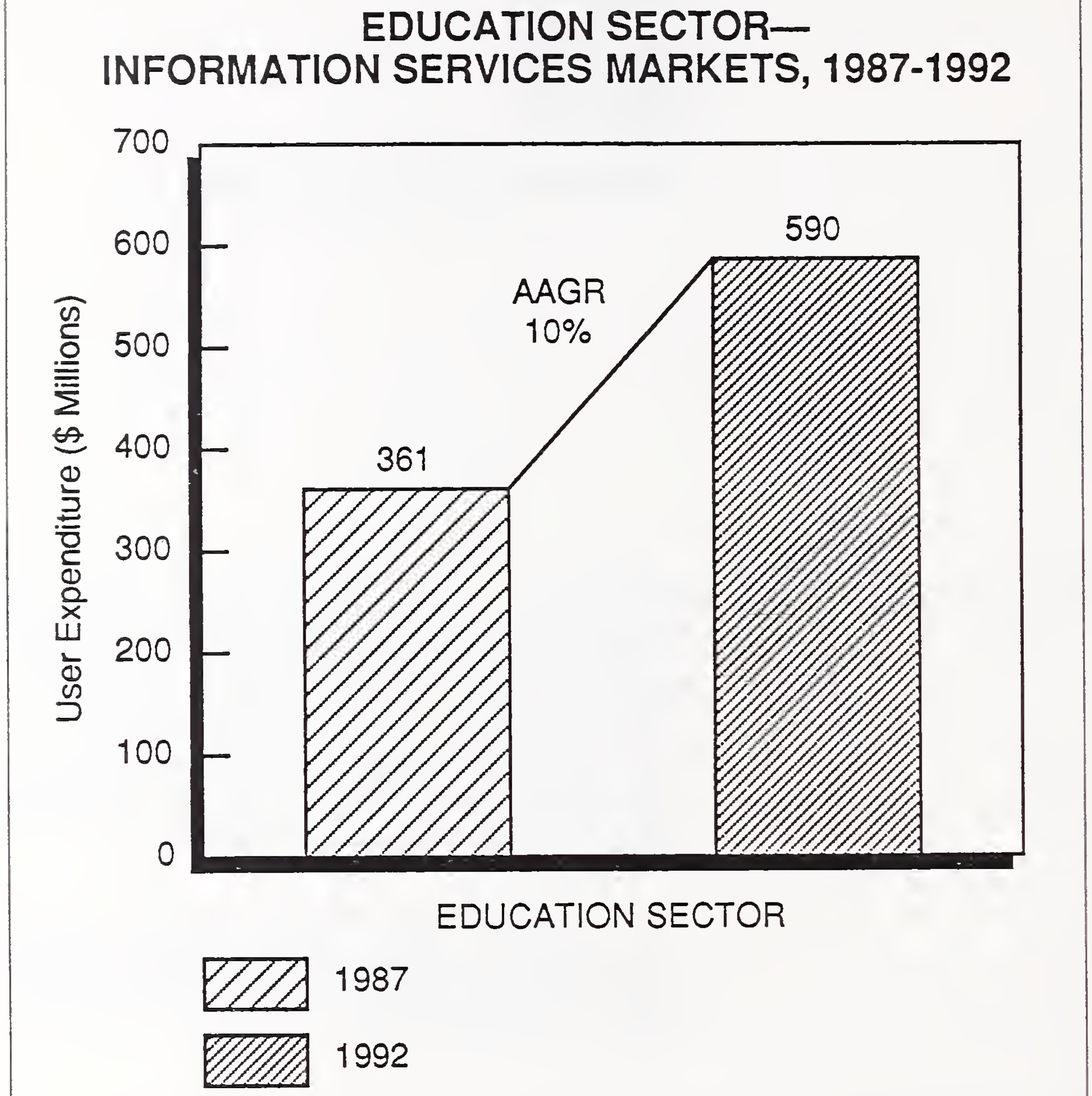
B Processing Services

User expenditures for processing services will grow at a 9% annual rate increasing from $149 million in 1987 to $234 million in 1992. As more organizations convert to minicomputer- or microcomputer-based applications, processing services will grow at a slower rate compared to applications software.

Many public school districts and parochial schools, satisfied with the level and quality of processing services, are not willing to hire and manage staff and will maintain the status-quo relationship with processing services.

As processing services moves from batch to interactive processing, more schools will migrate to processing services, rather than compete for data processing, administrative, programming, and operations staff. The federal government, through the National Science Foundation (NSF), has funded six university computer centers for advanced research projects in scientific and technical disciplines. These computers can be accessed through existing campus telecommunications links.

EXHIBIT II-1



C

Applications Software

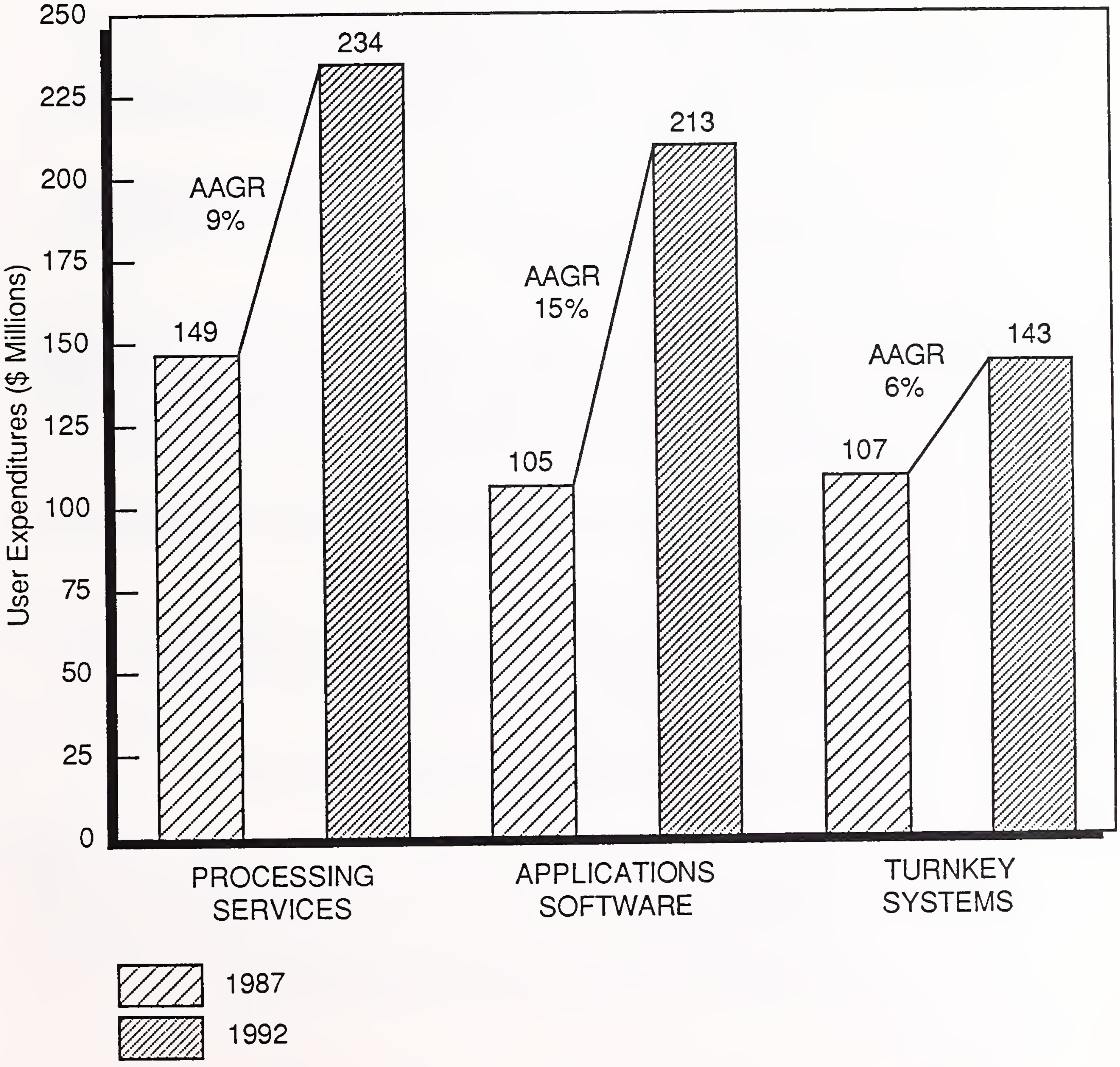
User expenditures for applications software will increase from $105 million in 1987 to $213 million in 1992 at an annual growth rate of 15%.

Factors influencing the growth of mainframe/minicomputer-based software include:

- Integrated software modules.
- Growth in school ownership of communication facilities.
- More state and local government reporting requirements.
- Increased Federal Government monitoring of school districts' personnel actions.
- Increased competition for high-quality students, faculty, and staff.

EXHIBIT II-2

EDUCATION SECTOR— INFORMATION SERVICES MARKETS BY DELIVERY MODE, 1987-1992



Factors slowing the growth in demand for mainframe/minicomputer-based applications software include:

- Continued buyer confusion about what hardware and software is actually necessary, hindered by the number of users on selection committees.
- Migration of current minicomputer applications to microcomputers.
- However, application migration down to microcomputers will be limited by the departmental or school-level (engineering, liberal arts, business) need for shared information.

Microcomputer-based applications software will grow fastest of all information services delivery modes, since more applications will initially be microcomputer-based.

D

Turnkey Systems

User expenditures for turnkey systems will grow the slowest among the delivery modes, at an annual rate of 6.1%, increasing from $107 million in 1987 to $143 million in 1992. Among the different systems, microcomputer-based systems will grow the fastest due to three reasons:

- Certain administrative functions, such as accounts payable or vehicle maintenance management and scheduling, can be implemented on a microcomputer.
- The greatest productivity gains will come from initial computerization. Cost-effective microcomputers, particularly IBM compatibles, will drive the purchase of microcomputers by numerous school districts.
- Existing microcomputer-based applications can be networked or set up to run on multiuser microcomputers or minicomputers.

New developments in the microcomputer arena, including Intel's 80386 microprocessor, IBM's PS/2 Series of computers, and Microsoft's OS/2 operating system will soon open up a new class of computers with superior price/performance characteristics. While new software must be developed to accommodate these machines, this provides an opportunity for improved applications software and courseware.

III

Competitive Developments

III

Competitive Developments

A

Introduction

The education information systems market is characterized by large vendors selling mainframe-based administrative software and numerous smaller vendors selling academic software.

The leaders in the administrative systems market segment are:

- Systems & Computer Technology Corporation.
- Information Associates.
- American Management Systems.

The leaders in the academic/research systems market segment are:

- National Computer Systems.
- Computer Curriculum Corporation.

Mergers and acquisitions activity was insignificant in 1987 indicating that:

- This is a relatively mature market dominated by a few large profitable companies.

- Second-tier companies have not introduced significant new products or applications that would make them attractive takeover targets.

- Internally generated cash has been sufficient to fund research and development, product marketing, and customer support activities.

B

Vendor Profiles

1. Systems & Computer Technology Corporation (4 Country View Road, Malvern, PA 19355)

Revenue (FYE 9/30/87): $42.0 million

a. Products/Services

Systems and Computer Technology Corporation (SCT) provides a broad range of systems integration and related services. These include applications software, information resource management services, telecommunications services, and custom software development.

b. Markets Served

SCT primarily serves educational institutions (colleges, universities, trade schools) and government jurisdictions (cities, counties).

c. Company Strategy

The resurgence in its core business has refocused SCT's attention on this area. The company plans to reduce its emphasis on new ventures and acquisitions that it had been exploring as business opportunities for over a year.

d. Recent Activities

In January 1987, SCT introduced a full line of telecommunications management and consulting services. These services encompass the design, implementation, and management of private telecommunications networks and the integration of data, voice, video, security, and environmental control into a total communications system.

In 1987, the company introduced two new software product lines - SYMMETRY Series and BANNER Series - both of which incorporate relational data base management systems. The SYMMETRY Series brings relational technology to IBM mainframe users, while the BANNER Series is aimed at mid-range IBM and DEC users.

e. Future Directions

In 1986 SCT announced a cash settlement to settle claims filed against the company between 1984 and 1986. The company has established a reserve fund in anticipation of legal expenses associated with continuing litigation against its former president. With new products and services introduced in 1987, and with a stronger financial position, SCT hopes to return to profitability and anticipates a better year for 1988.

2. American Management Systems, Inc. (1777 North Kent Street, Arlington, Virginia 22209)

Revenue (FYE 12/31/86): $135.5 million

a. Products/Services

American Management Systems (AMS) provides applications software and professional services to financial services firms, federal government agencies, state and local governments, colleges and universities, energy companies, and telecommunication companies.

In the education area, AMS markets software products to colleges and universities, and local school districts. College and University Financial System (CUFS) is a financial management system that provides budgeting, accounting, reporting and other financial functions.

The Development Information System (DIS) supports alumni record keeping, fund raising, and gift-processing activities for universities and also for nonprofit organizations.

Local Education Agency Financial Systems (LEAFS) provides integrated applications for the financial management of local school districts.

b. Markets Served

AMS focuses on the large institutions and companies. In the education area the company's target market includes the 300 largest colleges and universities.

c. Company Strategy

The company's goal is to be the leading national company in each of its largest market segments, and to focus on maintaining a long-term relationship with its clients. The company's strategy is to exploit its ability to develop and operate major management systems, its expertise in industry disciplines, and its range of software products to provide the best solution to its customers' needs.

d. Recent Activities

The company's fastest-growing business sector is the financial services industry.

In 1987, AMS was awarded several large multi-year contracts by federal, and state and local governments.

In the education sector, the company continues to enjoy robust sales.

e. Future Direction

Since 1982, AMS's marketing has focused on the larger companies and government agencies. There will be no radical new departures from this policy. The company will emphasize improving penetration in existing clients by expanding its range of products and services.

3. National Computer Systems, Inc. (11000 Prairie Lakes Drive, Eden Prairie, Minnesota 55344)
Revenue (FYE 1/31/86): $215.8 million

a. Products/Services

National Computer Systems (NCS) manufactures and markets a broad variety of information management products and services used in data collection, information analysis and reporting. NCS has three major operating units: scanning systems and services, software systems, and leasing.

The company markets two lines of large scanning systems: the Sentry 70 and the Sentry 80 series and two small desk-top scanner lines: the Sentry 2050 and the Sentry 3000. NCS is a leading supplier of computer-based optical mark reading (OMR) systems. NCS also markets software, forms, and tests to drive its scanners. The company provides a service bureau for customers who do not want to purchase scanners.

b. Markets Served

National Computer Systems primarily markets its products to the education market and to a lesser extent the government and financial markets.

c. Company Strategy

The company has expanded its original focus on the education arena. Two newer markets are health care and human resources.

d. Recent Activities

In mid-1987 NCS acquired a large block of stock of DataCard Corporation, a subsidiary of Deluxe Check Printers, Inc. (St. Paul, MN) and a few months later sold the stock for a substantial gain.

e. Future Direction

NCS has grown from $50 million in annual revenues in fiscal 1981 to $216 million in annual revenues in fiscal 1985. The company hopes to reach $500 million in annual revenues in the next five years. NCS plans to continue its emphasis on bringing applications and solutions to the markets it serves. NCS also anticipates growth from the promising newer markets.

4. Information Associates (3000 Ridge Road East, Rochester, New York 14622)

a. Products/Services

Information Associates develops and markets packaged applications software, utilizing IBM mainframes and DEC VAX superminicomputers.

Information Associates' product line, Series Z, comprises the following modules: Financial Records System, Student Information System, Human Resource System, and Alumni/Development System.

b. Markets Served

Information Associates markets its application software products to the higher education market, principally colleges and universities.

c. Company Strategy

Information Associates provides integrated software modules for the most popular hardware platforms for multi-building or multi-campus colleges and universities.

d. Recent Activities

In 1986 Management Science America (Atlanta, GA) acquired Information Associates.

e. Future Direction

Information Associates will continue to invest in new modules and enhancements to its education-based applications software line.

Depending upon the degree of support from Management Science America, Information Associates could begin developing products for other vertical market segments.

5. OCLC On-line Computer Library Center, Inc. (6565 Frantz Road, Dublin, Ohio 43017)
Revenue (FYE 6/30/87): $84.3 million

a. Products/Services

On-line Computer Library Center (OCLC) is a non-profit membership organization engaged in computer library service and research.

From its facility in Dublin, Ohio, OCLC operates an international computer network that libraries use to acquire and catalog books, arrange interlibrary loans, and gain access to other data bases.

OCLC provides decentralized computer systems and stand-alone microcomputer-based systems for individual libraries or clusters of libraries.

b. Markets Served

The primary users of OCLC's services and products are libraries, in educational and other institutions. More than 7,900 libraries contribute to and/or use information in the OCLC On-line Union Catalog, the world's largest data base of library bibliographic information. OCLC has participating libraries in over 20 countries.

c. Recent Activities

While no new products were announced in 1987, OCLC introduced enhanced versions of many of its on-line services and software products.

6. CLSI, Inc. (320 Nevada Street, Newtonville, Massachusetts 02160)

Revenue (1987): $31.1 million

a. Products/Services

CLSI provides computer-based automation products to libraries. The company's LIBS 100 Systems automates acquisitions, circulation control, cataloging, provision of an on-line catalog for public access, and serials management. Other CLSI products include CL-CAT, CL-CIRC, CL-Perline, and CL-MedLine.

b. Markets Served

CLSI's customers are primarily libraries.

c. Company Strategy

CLSI is committed to continued development and delivery of superior library automation systems.

d. Recent Activities

In May 1985, CLSI was acquired by TBG (formerly Thyssen Bornemisza), an international corporation. In July 1986, CLSI became the core organization in a newly established library group within TBG's Systems and Technologies strategic unit.

7. Cogito Data Systems (130 Sewaren Avenue, Sewaren, New Jersey 07077)

a. Products/Services

Cogito Data Systems develops and markets turnkey systems and processing services for school administration applications. The turnkey systems provide for student and instructor records, attendance, grade reporting, and instructor scheduling. The batch processing services handle attendance, scheduling, competency recordkeeping, grade reporting, guidance and master scheduling.

b. Markets Served

Cogito primarily serves the middle schools and secondary schools.

c. Company Strategy

Cogito is concentrating on the processing services for the educational and fleet maintenance markets, having sold the processing services business that handled petroleum industry applications.

Cogito is broadening the hardware platforms for its applications software and will look to IBM personal computers to reach new customers.

8. Pentamation Enterprises, Inc. (One Bethlehem Plaza, Bethlehem, Pennsylvania 18018)

a. Products/Services

Pentamation Enterprises supplies turnkey systems and related services to a variety of industry markets. In the education area the company's "student" packages provide for student registration and scheduling, grade reporting, and class attendance accounting. The "business office" package includes personnel and payroll, budgeting, revenue and expenditure accounting, and general ledger.

b. Markets Served

Pentamation markets to businesses, educational institutions, physicians' groups, and municipal governments.

c. Company Strategy

The company plans to provide a full line of applications software products for school districts. Pentamation is likely to focus its marketing efforts on the larger school districts.

9. Infocel (5711 Six Forks Road, Raleigh, North Carolina 27609)

a. Products/Services

Infocel develops and markets minicomputer- and microcomputer-based turnkey systems using the Pick operating system for vertical markets.

Infocel offers software modules for scheduling, student records, report cards, and instruction.

b. Markets Served

Infocel's turnkey systems are marketed to medium and large school districts, federal government, and state and local governments.

c. Company Strategy

Infocel plans to provide a full range of on-line, integrated, multi-user turnkey systems with installation, training, and on-going support aimed at its target markets.

d. Future Direction

The company plans to offer system integration services. Also, Infocel plans to offer systems based on hardware from several vendors to lessen dependence on a single vendor.

10. Computer Curriculum Corporation (700 Hansen Way, Palo Alto, California 94304)

a. Products/Services

Computer Curriculum Corporation (CCC) develops and markets course materials as part of a system for computer-assisted instruction.

b. Markets Served

CCC primarily serves primary and secondary schools and also remedial education programs.

c. Company Strategy

The company's strategy is to provide a full line of single-user and multi-user systems, complete courseware for mathematics, language arts, reading, and career counseling, and statistical measurement and evaluation techniques for computer-aided instruction.

d. Recent Activities

In October 1987, CCC introduced two new products. Math Concepts and Skills develops the skills needed to solve problems, think critically, and make inferences. In Reader's Workshop, students develop reading comprehension and critical thinking skills by interpreting both writing and graphics such as charts and tables.

In November 1987, CCC released the results of twelve studies that assessed the effect of CCC courseware on standardized test scores in math, reading, and language arts. The results indicated average gains of up to 1.75 grade years in seven months of computer-assisted instruction.

e. Future Direction

CCC plans to develop additional courseware for the Atari and other low-cost microcomputers.

IV

Information Systems Department Outlook

IV

Information Systems Department Outlook

A

Major Issues

1. Driving Forces

Administrative applications are being bought to increase the efficiency of the business and administrative functions in the education sector. Schools are purchasing microcomputers to "front end" larger computer systems. New administrative applications should integrate with the basic financial systems.

Strategic planning is higher education's latest buzzword. Like businesses, schools need to do strategic planning. This need is fueled by declining birth rates, an orientation toward "vocational" or skills-based training, and specific employer needs.

Desktop publishing is hot! It is being used to produce a wide range of materials for schools of all sizes. In addition, with the proliferation of personal computers, IS departments are hiring separate staff or allocating part of existing staff for end-user support.

The education sector continues to deal with political pressures such as:

- Cost cutting. While IS can provide a means to improve productivity and information for decision making in key administrative departments, it, too, is under severe cost constraints.

- Changing administrative requirements. State and local governments frequently change administrative reporting requirements and budgeting procedures. Working within a shifting bureaucracy represents a real challenge.

Improved service to high school and post-secondary school students remains a priority. Service improvements include better information for student registration, and better management reporting about the registration process. Declining birth rates in the 1960s have resulted in a smaller pool of applicants for post-secondary institutions, and this decline means colleges, universities, and technical and vocational schools must offer the right classes and services to students in order to grow.

Exhibit IV-1 lists the driving forces affecting IS departments in the education sector.

EXHIBIT IV-1

EDUCATION SECTOR—DRIVING FORCES

- Improve Education Administration
- Support Strategic Planning
- Begin Desktop Publishing
- Support End-User Computing
- Deal with Politics of Government and School Boards
- Improve Service to Students
- Appeal to a Decreasing Supply of Students for Post-Secondary Institutions

2. Issues and Objectives

IS must develop data-oriented as opposed to process-oriented information, representing a major change in the way educational institutions operate. Department-level fiefdoms are giving way to centrally managed resources with related growth in the information necessary to further the strategic planning efforts. A good example is the efforts of many institutional IS organizations to support the school's recruitment efforts; rather than strict cost reduction, IS must support post-secondary institutions' recruitment efforts. Such support consists of data base management programming and mail list management.

Another major issue is the establishment of centralized, integrated student information systems as the key means of providing better services to students. Better service is not simply a concept—it is a key differentiator among competing institutions.

Key IS objectives include:

- Resolving the paradox of providing more support to a broader range of users with tighter budgets.
- Waiting for technological advances or industry standards that will enable communication between incompatible hardware.
- Providing the necessary data to support an increased level of strategic planning by post-secondary schools.

Exhibits IV-2 and IV-3 summarize the issues and objectives identified by education sector survey respondents.

EXHIBIT IV-2

EDUCATION SECTOR—ISSUES

- Develop Data-Oriented Information
- Support Recruiting Activities
- Improve Student Information Systems

EXHIBIT IV-3

EDUCATION SECTOR—OBJECTIVES

- Resolve Less Budget/More Support Paradox
- Resolve Incompatibility Among Computers and Networks
- Develop Necessary Data to Support Strategic Planning

3. Management Perception and Organizational Issues

With the growing importance of strategic planning, schools' senior management is relying heavily on IS directors to define and implement the necessary information. IS is now directly supporting senior management at post-secondary institutions in two key areas—financial information and the long-range planning process.

- Financial information must be gathered and consolidated in a meaningful way for use by senior management.
- No longer can university presidents run a fully decentralized operation. Deans and department heads are being made accountable for head counts, capital budgets, and operating budgets to support long-range objectives.

Since they do not directly represent a particular department or academic discipline, IS directors are seen as a "neutral" party to gather and present necessary information; hence, their importance is increasing. Furthermore, technological advances in networking, data base software, and integrated voice/data communications are forcing recognition of the skills and knowledge of the IS director.

Retaining technical staff is becoming a critical success factor. Some schools have experienced incredible turnover during the past year, with staff lured by better salaries and growth opportunities in other industries. As a result of key staff shortages, IS management cannot implement departmental plans.

4. Impact of Technology

The impact of technology in the education sector is shown in Exhibit IV-4.

New technology has fostered a faster document turnaround to meet the demands for faster-paced administrative processing. Also, networks enable colleges and universities to link geographically separate offices/ branches for file transfer and administrative purposes.

INPUT also observed that universities are taking advantage of the fact that replacing old with newer technology will permit growth in processing capability and storage capacity while maintaining a flat budget. And, new technology has enabled IS to promote a "buy-in" by senior management of computerization through daily use of computers as a tool. Major administrative functions include: electronic mail, calendars, data manipulation, and report writing.

EXHIBIT IV-4

EDUCATION SECTOR—IMPACT OF TECHNOLOGY

- Improved Response Times
- Improved Communication
- Improved Efficiency of Computer Equipment
- Heightened Computer Awareness by Senior Management
- Better and Faster Compliance with Changes in Laws

Finally, new technology has enabled schools to better comply with changes in state and federal laws and related reporting requirements as well as changes in auditing procedures.

B
New Applications

Colleges and universities support a wide range of business activities, resulting in a diverse base of applications software. Primary applications include: accounting and finance, admission, financial aid, development/ fund raising, registration, bookstore, and administrative offices of the president and various deans. Exhibit IV-5 details new applications identified by INPUT survey respondents.

EXHIBIT IV-5

EDUCATION SECTOR— NEW APPLICATIONS IN 1987

- Applications Based on Data Base Management Systems
- Voice/Data Networks
- Desktop Publishing

Post-secondary and secondary institutions are implementing more applications based on data base management systems, including:

- Registrar files.
- On-line library catalog systems.
- On-line registration.
- On-line student fee collection systems.
- Budgeting systems.
- Installation tracking of microcomputer hardware and software.
- Purchasing.

Campuswide voice/data networks, while not strictly application software based, are becoming more widespread. The past two years' planning efforts are becoming reality.

The hottest new application is microcomputer-based desktop publishing. Between 1986 and 1987, desktop publishing appeared across a diverse user base of educational institutions. INPUT believes this represents a significant trend, not a one-time temporary aberration.

The education sector has a few IS needs that respondents believe are not well served by vendors. Specifically, schools want:

- A network version of Lotus 1-2-3.

- Micro-to-mainframe links, especially those compatible with IBM mainframe operating systems.

- Software to integrate existing workstations.

- CPU to CPU communication between different vendors' products.

- More software for primary and secondary school districts' applications, especially payroll, personnel, and finance, running on non-DEC and non-IBM computers.

The education sector is divided in its approach to software development. Larger colleges and universities tend to develop new applications in-house while smaller colleges and universities generally rely on third-party software for new applications. In either case, maintenance and enhancement of existing applications take a far greater share of the resources than developing new applications.

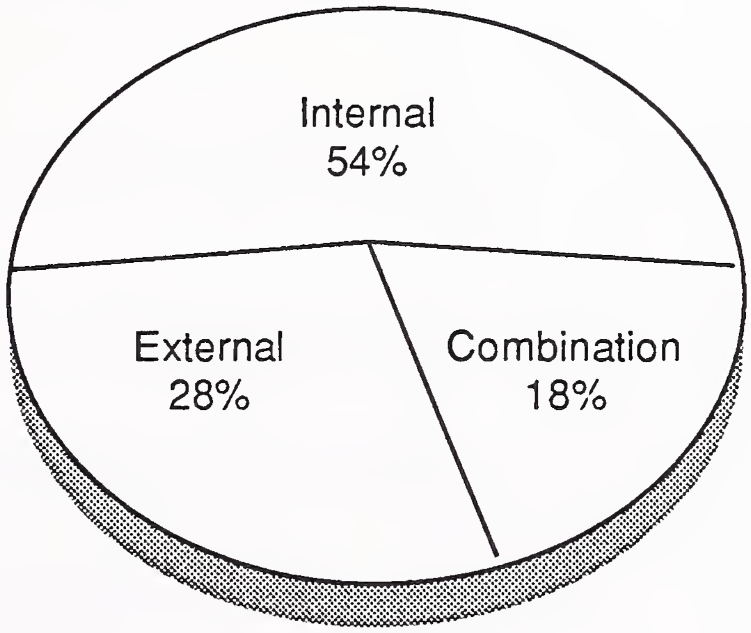
- Larger colleges and universities devote around 40% of software development staff to developing new applications.

- Smaller schools devote less than 25% of their software development staff to developing new applications.

Exhibit IV-6 shows educational institutions' sources for new applications software. Internally developed software continues to be the most prevalent. However, off-the-shelf applications software is used more than is a combination of third-party software with either internal development or outside professional services.

EXHIBIT IV-6

EDUCATION SECTOR—NEW SOURCES OF APPLICATION DEVELOPMENT (For Major New Applications)



Cost Range of New Applications Software:
- Mainframe-Based: $30,000 - $1,000,000
- Minicomputer-Based: $15,000 - $800,000
- Microcomputer-Based: $125 - $16,000

Average Cost of New Applications Software:
- Mainframe-Based: $450,000
- Minicomputer-Based: $205,000
- Microcomputer-Based: $975

- Driven by legislative and accounting requirements, more schools are now updating their 1970s-vintage, in-house-developed software.

- The relatively low salaries paid to programmers and systems analysts in the education sector may provide economic justification for continuing in-house applications software development.

- While it may be necessary for more schools to eventually shift to third-party integrated applications software, many schools continue to do in-house work, reflecting a "not invented here" attitude.

- However, there are not sufficient in-house programmers to both maintain and enhance existing applications and develop new applications. The increase in external software development indicates IS management is moving in the right direction.

C

Budget Analysis

In 1987, respondents experienced limited growth in their IS budgets, due primarily to increases in salaries, fringe benefits, and applications software.

- IS spending in 1988 is projected to increase 3-5% because of inflation, salaries, and benefits.

- Exhibit IV-7 shows the 1987 budget distribution and projects the growth in specific budget categories in 1988.

In general, private secondary and post-secondary schools' budgets are growing at a faster pace than those of public secondary and post-secondary schools. IS spending in unified primary and secondary school districts is increasing at a slower rate than in nonunified school districts.

Nearly 80% of the respondents project their IS budgets will increase or remain the same in 1988 as compared to 1987. More than 50% of respondents believe the 1988 growth rates will be greater than in 1987 (see Exhibit IV-8).

- Factors contributing to increases in the IS budget include (in order of most frequently mentioned factors):

    - Hardware maintenance.
    - Software maintenance.
    - Personnel expenses.
    - New applications software purchases.
    - New hardware purchases.
    - Telecommunications cost increases.

EXHIBIT IV-7

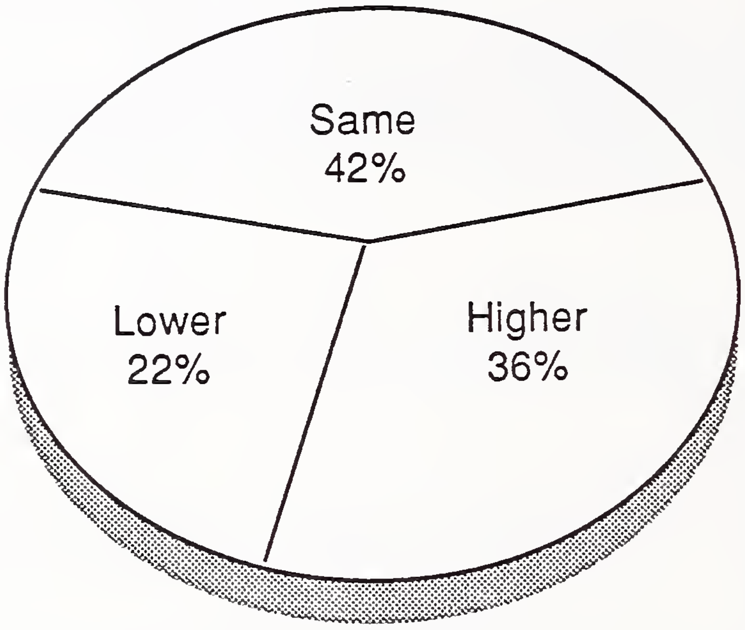
EDUCATION SECTOR—1987 BUDGET DISTRIBUTION AND 1987-1988 CHANGES

BUDGET CATEGORY	1987 I.S. BUDGET (Percent)	1987-1988 Expected Budget Growth (Percent)
PERSONNEL (Salaries & Fringe Benefits)	48.2	2.6
HARDWARE		
Mainframes	6.7	2.1
Minicomputers	6.7	3.5
Microcomputers	5.3	3.9
Mass Storage Devices	4.2	2.0
Other Hardware	0.6	1.1
TOTAL HARDWARE	23.5	2.8
Data & Voice Communications	3.7	5.2
External Software	7.3	12.6
Professional Services	0.3	(0.7)
Turnkey Systems	0.1	0.3
Software Maintenance	2.4	1.9
Hardware Maintenance	8.3	4.5
Outside Processing Services	0.2	(2.0)
Supplies	5.1	2.5
Travel, Subscriptions, Etc.	0.9	1.1
TOTAL	100.0	3.6

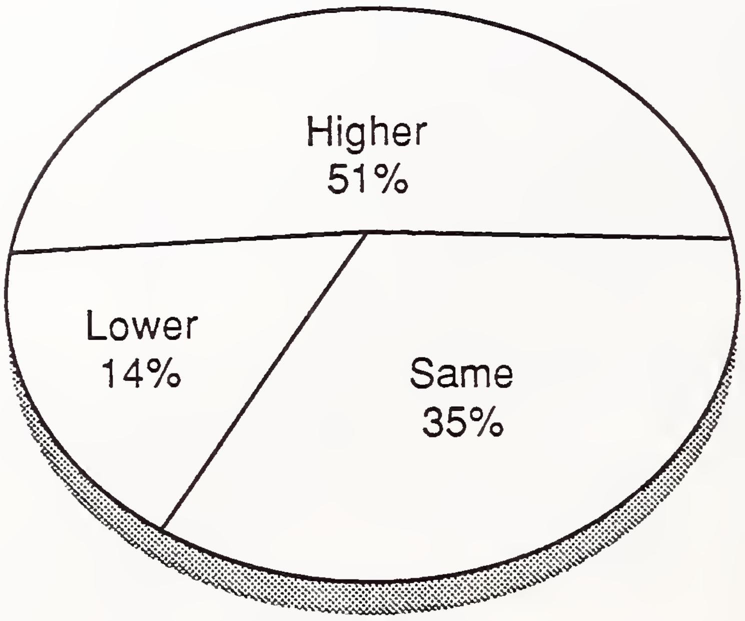
EXHIBIT IV-8

EDUCATION SECTOR— MOST BUDGETS ARE INCREASING AT A FASTER RATE

Comparison of
1988 and 1987
I.S. Budget



Comparison of
Changes in Growth Rates of
1987 and 1988 I.S. Budgets



- One factor was listed as the major contributing factor to decreases in the IS budget, namely declining state/local economies (which lead to decreases in funding from the legislature).

Head count from 1986 to 1987 within education sector IS departments changed, but without a significant pattern.

- Twenty-three percent indicated the head count increased.
- Forty-four percent indicated the head count remained the same.
- Thirty-three percent indicated the head count decreased.

The head count increased in institutions implementing new, expensive applications. Generally, head counts in junior colleges and secondary school districts were the same as last year.

V

New Opportunities

V

New Opportunities

V

New Opportunities

A

Education Market Sector

Software integration is more important to users than the widely touted hardware integration for two reasons:

- Software equals functionality; hardware means capacity.
- Excess hardware capacity exists in the education market sector as a result of demands by user committees for applications that were never implemented.

Software and professional services in support of local-area networks represent a growing area. Software must retain its functionality on the network; professional services such as consulting with the LAN vendor may be necessary to sell more software and ensure the software actually works.

B

Administrative Market Segment

The institutional development, or fund-raising, function will become more important. Schools must garner more funding from alumni and corporations to help keep pace with rising costs.

- Only 10-50% of university alumni contribute to their alma maters; thus, tremendous potential exists for software in the university development department.
- Currently, software helps track donations. In the future, it can be used to help tailor and administer all aspects of university development campaigns, including prospecting letters, telephone solicitation results, annual contributions, special requests, and followup.

As variable funding forces educational institutions to operate more as profit centers, the need for asset management software will increase. Key school assets include buildings, vehicles, and the computer system.

Just as the top three factors for success in real estate investing are "location, location, and location," the key factors for success in the nation's educational institutions are rapidly becoming "marketing, marketing, and marketing." Relational data base software for analyzing and tracking target students, staff, and faculty is imperative for post-secondary institutions.

C

Academic Market Segment

Microcomputer software can be divided into smaller segments, each offering increased functionality, as a means to providing "better" products and improved market penetration. Courseware can likewise be packaged into smaller modules.

As the academic software market matures, key company differentiators will shift from products to service and support. Customer education and training, consulting, maintenance, site analysis, and the like will play a much greater role in the software sales process. Now is the time to begin developing and marketing these services.

Although software is used in elementary and secondary schools, most is used for administration and teaching students computer literacy and basic skills like writing and math. What is needed is software that teaches higher-level thinking skills like problem solving and collaborative projects.

Schools seek programs that can be integrated into day-to-day teaching. Educators want flexible programs or open-ended programs that will allow them to enter their own data and their own questions. Also, educators are interested in solutions that include hardware, software, and management reports that specify how students progress on various tasks.

D

Library Market Segment

The nation's public, college, and university libraries represent a large, well-defined market niche with the following software requirements:

- Business and financial administration.
- Personnel administration.
- Checkout of books, magazines, and other periodicals.
- Interlibrary and intralibrary loan.
- Tracking books and periodicals at the bindery.
- Card catalog administration.
- Reference information.

Microcomputer-based turnkey systems that allow the staff at smaller libraries to access diverse storage media (microfiche, newspapers, magazines, books, on-line databases, etc.) would be useful. While the research at the On-Line Computer Library Center may lead to a large-scale solu-

tion, small- and medium-size organizations may not need the "full blown" solution and would be satisfied with a solution offering reduced functionality at a much lower price.

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VI

Conclusions and Recommendations

VI

Conclusions and Recommendations

The combination of changing demographics and variable year-to-year government funding is forcing educational institutions to emphasize marketing.

Successful vendors will balance the conflicting needs for increased software functionality and extensive support at a reduced price.

The most promising products and services will improve asset management, fund raising, student selection and retention, and library administration.

ED-A

Appendix: Forecast Data Base

ED-A

Appendix: Forecast Data Base

This appendix contains the following financial forecast information, as shown in Exhibit ED-A-1.

- Market size by delivery mode for each year, 1986-1992.
- Market growth rates for 1986-1987.
- Average annual growth rate (AAGR for each delivery mode for the five-year period 1987-1992).

EXHIBIT ED-A-1

EDUCATION SECTOR— INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST 1987-1992

SEGMENTATION BY DELIVERY MODE	($M) 1986	86-87 GROWTH (%)	($M) 1987	($M) 1988	($M) 1989	($M) 1990	($M) 1991	($M) 1992	AAGR 87-92 (%)
Processing/Network Services									
- Remote Comp/Batch	114	12	128	142	158	175	193	212	11
- Facility Management	20	5	21	21	21	22	22	22	1
Total Processing Services	134	11	149	163	179	197	215	234	9
Application Software									
- Mainframe/Mini	30	17	35	40	46	52	59	66	14
- Micro	57	23	70	84	99	115	131	147	16
Total Application Software	87	21	105	124	145	167	190	213	15
Turnkey Systems	96	11	107	117	124	130	138	143	6
Sector Total	317	14	361	404	448	494	543	590	10

ED-B

Appendix: Forecast Reconciliation

ED-B

Appendix: Forecast Reconciliation

This appendix contains the following information:

- Exhibit ED-B-1, which includes the changes made in this year's forecast as compared to last year's.
- An explanation of any significant changes that were made to the forecasts.

INPUT has reduced the five-year growth rate (AAGR) for turnkey systems from 14% to 6%. The education sector is exhibiting a preference for industry-standard hardware and software from different vendors rather than turnkey systems from a single vendor, as this offers customers greater choice and flexibility in assembling systems. As a result, the forecast for the 1991 market for turnkey systems made in 1987 is 46% lower compared to the corresponding forecast made in 1986.

EXHIBIT ED-B-1

EDUCATION SECTOR— DATA BASE RECONCILIATION OF MARKET FORECAST— INDUSTRY-SPECIFIC BY DELIVERY MODE

DELIVERY MODE	1986 MARKET			1991 MARKET			86-91 AAGR FCST IN '86 RPT (%)	87-92 AAGR FCST IN '87 RPT (%)
	1986 FCST ($M)	1987 RPT ($M)	VARIANCE AS % OF '87 RPT	1986 FCST ($M)	1987 RPT ($M)	VARIANCE AS % OF '87 FCST		
Processing Services								
- Remote Comp/Batch	112	114	-2	188	193	-3	11	11
- Facility Management	20	20	0	25	22	14	5	1
Total Processing Services	132	134	-1	213	215	-1	10	9
Application Software	81	87	-7	178	190	-6	17	15
Turnkey Systems	103	96	7	201	138	46	14	6
Industry-Specific Segment Total	316	317	0	592	543	9	13	10

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I

Issues, Trends, and Events

I

Issues, Trends, and Events

While the federal government market will continue to grow, the pace will be more moderate in the near term in response to deficit control efforts. The need for the government to improve the quality and quantity of ADP-supported services under these constraints presents unique opportunities for vendors. (Note: The abbreviation "ADP," which is used commonly in the federal government and throughout this report, refers to Automated Data Processing and is analogous to EDP (Electronic Data Processing).

The key forces that will impact this market are:

- Current administration and congressional measures to reduce the federal budget deficit will reduce expenditures for ADP services in 1988 and 1989.
- The federal workforce remains heavily committed to maintaining existing systems and is inadequately staffed to develop needed new and replacement systems.
- Initial budget cuts will affect vendors as agencies protect in-house staffs, but future service needs will be met by the increased use of service contracts.
- Wary of late delivery and/or cost overruns, federal agencies are now moving toward increased vendor risk-sharing contracts and service guarantees.

A

Budget and Personnel Constraints

The federal government has a need that extends into the 1990s to steadily improve the quality and quantity of ADP services. This must be done, in part, by overcoming the handicap of a rapidly aging Automatic Data Processing Equipment (ADPE) inventory. However, escalating costs for hardware and software and the constraints applied by budget and personnel reductions make the goal that much harder to achieve.

The federal government does not currently have the in-house staff necessary to support the quality or quantity of ADP services required. When the federal government does not have the capability to perform work with in-house personnel, it contracts the work to outside services vendors. There are strong indications that the government will make increasing use of services contracts beginning late in 1988 and continuing through the remainder of this decade.

However, government spending has exceeded revenue receipts in the last several years. If left unchecked, the shortfall could top $169 billion in 1988, jeopardizing funding requests for contracted services.

To reduce the deficit, Congress passed the Balanced Budget and Emergency Deficit Control Act of 1985—better known by the names of its primary sponsors, Gramm, Rudman, and Hollings (GRH). GRH requires elimination of the federal deficit by 1991. To meet this goal, spending in 1988 must be reduced by 5.3% for civilian programs and 5.6% for all military programs.

Although the future application of GRH cannot be forecasted, federal agencies indicate some likely directions with respect to information technology obligations.

- At the very least, GRH signals a halt to acquisition of new hardware "because it's there." Agency managers at all levels will now be required to rethink their productivity improvement plans and prepare to provide credible evidence to a top-level review council that the proposed acquisitions will indeed provide benefits (read "cost savings") that could not be as readily achieved via other strategies.

- For some agencies, meeting GRH deficit reduction levels will require spending cuts of varying magnitude from travel restrictions and training and support reductions to limitations in the number of planned equipment purchases on a given contract.

- A third response may be to stretch out programs and/or combine second-tier programs with other, more beneficial first-tier programs. This approach will be embraced particularly for initiatives that meet deficit reduction objectives but do not deliver the short-term benefits. A variation on this approach may result in the restructuring of proposed initiatives. Several agencies stated that they are now considering restrictions of their current hardware suite and/or scaling back the hardware component of initiatives that are about to get underway.

Agencies have made a number of procurement decisions at this point. The applicability of GRH, in terms of the specific dollar reductions required at the subagency level, has led to a "wait and see" posture. As one respondent put it, "Given time, Gramm-Rudman may go away, and if it doesn't, at least the reduction requirements will be clear."

B
Maintaining Existing Systems

Much of the existing inventory of ADPE lacks flexibility, transaction speed, and memory to satisfy current and future requirements. Most of the current or planned acquisitions are aimed at upgrading this equipment and converting or replacing the software systems associated with the equipment.

- With massive upgrade efforts underway and support requirements likely to plateau, many agencies believe this is a time to rethink the progress to date and reaccess whether the progress has resulted in improvements in the way the government does its work. Are agencies producing the required information, and only that information, and is there a clear movement from data to information technology?

An objective of the upgrades, of course, is reduction of the long-term costs of maintenance and software development. The Government Accounting Office (GAO) has estimated that 70% of the federal government's life cycle costs of software are related to maintenance.

- As more software is developed by the government, more software maintenance will be required to keep that software functional. But more flexible hardware, coupled with the use of modern software (standard packages, disposable software) and productivity aids, may offset the costs associated with the increased need.

- One alternative course of action has been the exemplary program of standardizing languages within the DoD. Among federal agencies, DoD has witnessed a proliferation of software at the same time the programmer force has been shrinking. To reduce the rate of growth of software development and maintenance costs, DoD is seeking productivity improvements by using fewer languages.

C
Federal Regulations and Policies

Contracted services are acquired under a variety of regulations. In an attempt to expedite the federal acquisition process, which can take as long as two years for major acquisitions, and to provide a single set of procurement procedures, the Federal Acquisitions Regulations (FARs) were adopted in 1984. The FARs regulate procurement of goods and services not included under the Federal Information Resource Management Regulations (FIRMRs). The FARs also apply to ADP and Communications for the acquisition of:

- Mission-critical computer resources of DoD.
- Public-oriented systems such as air traffic control and biomedicine.
- Classified systems of the intelligence community.

The FIRMRs, also taking effect in 1984, provide a single regulation for the acquisition, management, and use of general-purpose information technology (ADP and telecommunications) by combining FPRs, FARs, and FPMRs.)

The Competition in Contracting Act (CICA) of 1985 provides expanded legal powers for ADP protest action via GSA Board of Contract Appeals and GAO, increases the opportunity to employ negotiated contracts, and establishes seven more restrictive categories of exceptions that permit sole-source awards.

The Small Business Equal Competition Act (SBECA) of 1984 requires publication in the Commerce Business Daily (CBD) of an agency's intent to award sole-source contracts or GSA's intent to modify FIRMR or FAR in a manner that would require an increase in paperwork or eliminate competition from small businesses.

The OMB A-109 policy is still in effect, but only for larger ($100-$500 million) contracts or acquisition of "controversial" systems. The A-109 acquisition procedure requires early participation of potential prime bidders and some of the principal first-tier subcontractors.

There are several other policies that also impact services acquisition practices:

- OMB Policy A-76 (Policies for Acquiring Commercial Industrial Products and Services Needed by the Government) recommends government reliance on the private sector for goods and services. This policy has now become the administration's Productivity Improvement Program (PIP), putting even more emphasis on cost-effective performance of ADP and other services.
  - The policy requires a comparison of the cost of in-house staff and contractor performance of services (including professional services) whenever an agency plans a major upgrade, replacement, or start of ADP resources. This comparison is an attempt to determine if in-house is, in fact, cheaper than commercial acquisitions.
  - OMB A-76 comparisons are usually applied to facilities management and site operation and maintenance contracts, and rarely to system design and software development projects.
  - To gain efficiency, the policy supports transition from the earlier "body-shop"-type contracting. Under the latter, the vendor determines the staffing needs and skills mix to perform the tasks.
- The Defense Appropriations Act of 1984 included a "Buy-Not-Lease" mandate. Although the DoD mandate was not fully funded in GFY 1984-1987, it could have far-reaching implications in DoD where more than $1.3 billion of currently leased ADPE still remains to be replaced in the next three years.

  - The mandate dictated competitive acquisition of replacement systems where the purchase option would acquire obsolete equipment. Professional services vendors could be asked to bid system design and system integration opportunities.

  - Because of the additional funding that would be directed toward purchase of equipment, one possibility is a slowdown in the upgrading process to new, more modern equipment and an increase in the amount of maintenance required to keep obsolete equipment (and the software designed to run on that equipment) operational until replacement.

  - Competitive replacement of leased systems could also offer opportunities for code conversion, new software development, and training.

Reduced emphasis on the use of small businesses, in particular the 8(a) program, has eroded the small business share of government contracts, as shown by the drastic decline of contracting by the Departments of Education, Health and Human Services, and Labor, according to the House Small-Business Committee. The inclusion of a small business subcontracting plan in large ADP system bids is required by DoD, NASA, and Transportation.

Four federal agencies (the Department of Agriculture, the Department of Health and Human Services, the Department of the Navy, and the National Aeronautics and Space Administration) have agreed to participate in the General Services Administration “Go for 12” Program.

- The program is designed to streamline the lengthy process required for the acquisition of automatic data processing and telecommunications resources to a point where major systems acquisitions are accomplished within a 12-month period.

- Each agency will work with GSA in one of three pilot projects designed to model and test different aspects of the acquisition process.

- The three aspects of the program are:

  - Elimination of unnecessary bottlenecks in the acquisition process.
  - Potential for parallel review of acquisitions.
  - Provision for special training in ADP and telecommunications acquisitions.

D

Advantages and Disadvantages of Contracting

Vendors provide services to the government under a variety of contract types.

- Cost-plus contracts provide for vendor costs to be paid and a fee added that is either negotiated (cost-plus-fixed-fee) or based upon the performance of the contractor in satisfying the contract requirement (cost-plus-award fee). Cost-plus contracts regulate the margin of profit allowed, but clearly place the risk with the government.

- Fixed-price contracts commit vendors to perform and complete a contract at a predetermined price ceiling. To a significant extent, the profitability associated with a fixed-price contract is dependent upon the vendor's ability to accurately appraise, in advance, the cost of providing services. Managing fixed-price contracts successfully requires an extremely well written and detailed statement of work and project scope. The risk of completion is placed on the vendor.
- Level of effort (LOE) or time and materials (T&M) contracts provide for an hourly billing plus the reimbursement by the government for travel, supplies, equipment, and other materials required to satisfy the terms of the contract. In many competitive situations, vendors are required to combine their contract with a "not-to-exceed" clause that essentially imposes cost ceilings on the contract.

There will be a continuing emphasis on fixed-price contracting,, especially in software development, but there is also a general drift to cost plus award or incentive fee (versus fixed-fee) to control project schedule slippage. Many agencies use cost-plus in early and/or difficult stages and then make the transition to fixed-price when the solution is set.

The major reason the civil agencies and DoD use outside contractors is because the contractors provide experience and expertise that are not available internally.

- Professional services contracts in particular are used because they give the agency the ability to balance workloads without increasing or decreasing government staff as requirements are added and/or removed.
- Some government respondents believe that contractor labor is less expensive than performing the same task with government employees, especially when fixed-price contracting enables the government to put a ceiling on the overall cost.
- Objectivity, which includes the ability of the contractor to take an unbiased approach to a problem without being affected by internal agency politics, is a less important benefit.
- The civil agencies consider expediency advantageous. Expediency, in terms of accelerated schedules and fewer problems with government rules, regulations, and policies than if the work were to be performed in-house, is considered a benefit of outside contracting. This judgement is particularly true in civil agencies that have fewer in-house personnel than their DoD counterparts.

The primary disadvantage agencies see in using service vendors is the complexity and senior staff demands for managing contracts. Other disadvantages include:

- Performance risk, or the concern on the part of government agencies that the contractor will deliver an acceptable product on time.
- The problems associated with procurement, including the long lead time required for contracting and the risk of protest by losing bidders.
- The learning curve, or the time it takes contractors to "come up to speed" on the problem.

Although the agencies could not accomplish all of their assigned work without contractor support, it is considered by some agencies to be a disadvantage to become dependent on a contractor.

- This agency concern is because contracting for professional services weakens the agency's ability to do further work because the contractor ends up with most of the expertise in this functional area of work. If the contractor does not allow the government in-house staff to build its skills, then when the contractor leaves the expertise leaves. When contracts are recompeted, some loss in continuity can occur if the incumbent is replaced and takes the core staff.

Vendors view the disadvantages and liabilities of contracting for professional services in ways similar to those of the government agencies cited earlier.

- The major disadvantage is associated with the actual procurement process. Vendors consider the government procurement process long and inflexible. They believe the government has a problem evaluating quality versus price, and there is always the threat of protest if the lowest-priced bidder does not win.
- Performance risk is viewed by the agencies as a liability, vendors believe, because agencies are not able to control contractor personnel.
- Contract management is also considered a significant disadvantage. Some vendors state that dealing with the complexities and legal obligations of a contract pose problems.

E

Agency Selection Criteria and Satisfaction Levels

The opportunities for computer services vendors within the federal government segment, while attractive, must be weighed against its competitive characteristics. In this section, the issues surrounding government contracting are presented from a vendor's point of view.

The process of selecting a vendor for a services contract is one of professional evaluation. The bid selection criteria, showing some variation among agencies and even among specific projects within each agency, usually involves, in order:

- Proposed technical solution; that is, the extent to which the proposed solution meets the requirements.

- Vendor reputation for providing satisfactory products and services to federal clients as well as their corporate commitment to providing support during projects and after implementation.

- Risk containment procedures, including adequacy of reporting schemes and progress reports.

- Cost, although this is considered by contracting personnel as a primary criteria only when two or more vendors propose similar approaches and/or equipment. Vendors frequently complain that the government gives "lip service" to total life cycle costs but really buys on the basis of front-end costs.

Although agencies and vendors agree on the order of importance of these bid selection criteria, civil agencies, DoD agencies, and vendors totally disagree on the importance of characteristics of successful contractors.

The largest differences between the rankings of civil and DoD agencies reflect unique characteristics and needs.

- DoD agencies tend to be more price and hardware sensitive than civil agencies.

- To meet the importance of these sensitive issues, DoD is generally willing to reduce its expectations for the vendors' staff and application experience. And, since DoD has a larger, more experienced stable of in-house personnel, this trade-off is not particularly risky for them.

- Civil agencies, on the other hand, generally have smaller, less experienced staffs and need to utilize as much vendor experience as possible and are willing to pay the price.

Although vendors should appreciate these agency differences and reflect them in bid preparation, they must be even more sensitive to the larger differences between their own views of important vendor characteristics and those of the agencies, both civil and DoD.

- Support is often rated as the least important characteristic by vendors, but support is ranked second or third by agencies.

- Vendors should emphasize their support capabilities and performance in their bids. Unfortunately, it is INPUT's experience that most services vendors cannot provide evidence of customer satisfaction since they do not carry out systematic surveys in this area.

The vendor actions resulting from these discrepancies lead agencies to have lower levels of satisfaction than would be desired. DoD agencies, in general, seem less satisfied with the performance of services vendors than do civil agencies. DoD's greatest concerns are missed delivery schedules and cost overruns.

The discrepancies suggest that vendors should become more aware of specific agency needs and adapt strategies to match their capabilities to those needs, rather than attempting to modify the agency needs to meet an available solution.

The continuing federal budget pressures as well as the growing amount of competition have created a price-sensitive market where the winners are working with progressively narrower margins, more tightly controlled overhead, and reduced management structure.

Bid development now requires in-depth pre-solicitation intelligence and early executive management involvement. Companies that fail to accurately assess their prospects find themselves wasting scarce proposal dollars in expensive bidding failures.

II

Market Forecasts

II

Market Forecasts

The U.S. government is the largest user of information technology in the world. More than 120,000 federal workers currently manage approximately 22,000 medium- and large-scale computers and over 250,000 microcomputers. In 1988, nearly $19 billion will be spent on information technology, about 1.7% of the total U.S. government budget.

Virtually every major federal program depends on productive use of information technology for its success. Not only is information more available today than even five years ago, it is more widely dispersed.

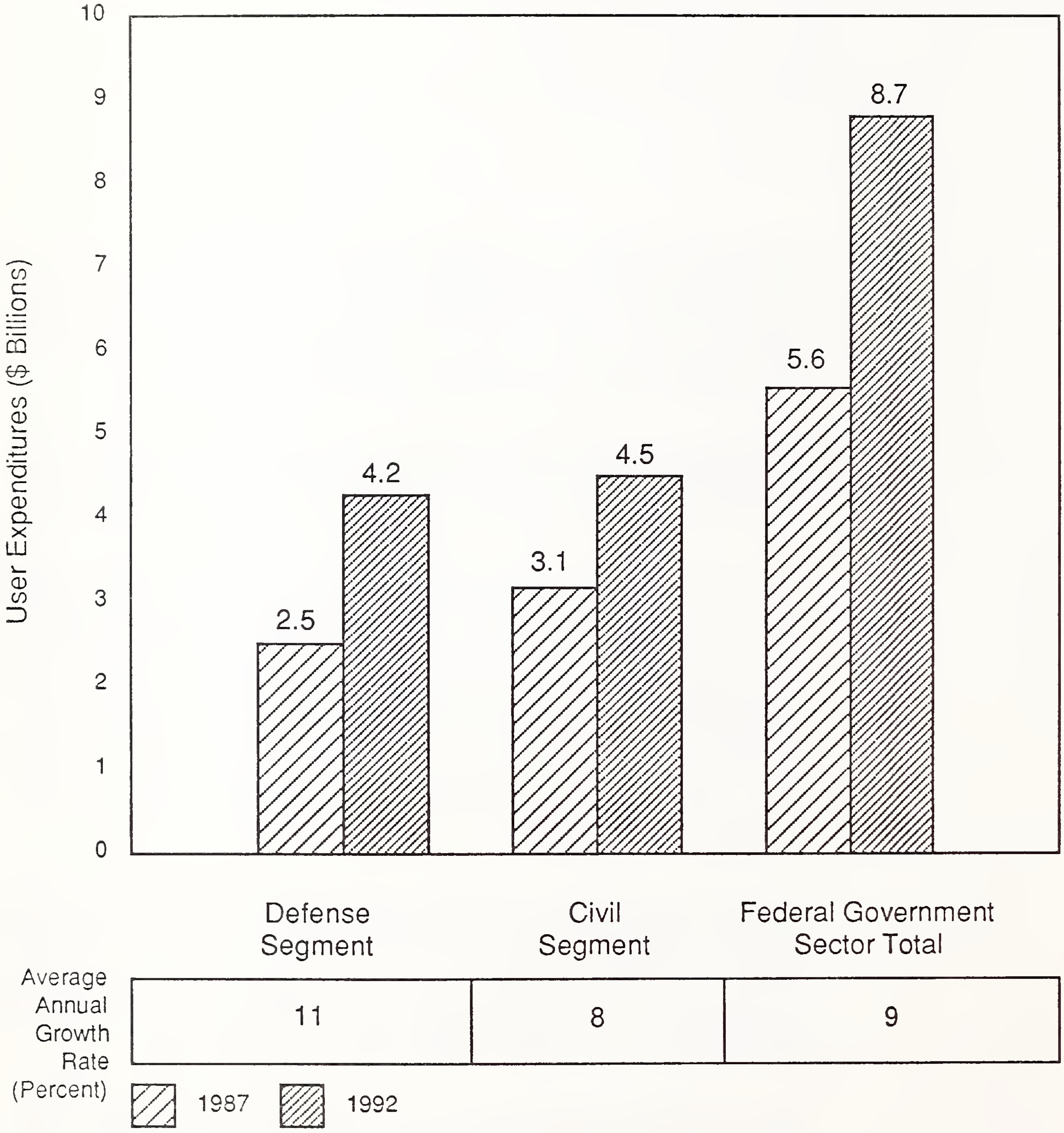
The relationship between the federal government and the developing field of information technology has been a series of hills and valleys. Federal agencies were among the first organizations to develop automated information and service delivery systems, but by the late 1970s the federal government's leadership in computer applications was eroding. Instead, the federal government found itself dependent on systems that were outdated and not cost-effective. Today, the government is in the midst of an important effort to modernize its computer and data processing systems. The changes—both under way and on the drawing board—are dramatic and far-reaching.

The computer services and software portion of the information technology (IT) budget will increase from $5.6 billion in 1987 to $8.7 billion in 1992, an average annual growth rate (AAGR) of 9% (see Exhibit II-1). The defense sector will experience the stronger growth at 11% AAGR, growing from $2.5 billion to $4.2 billion. The civil sector will grow from $3.1 billion in 1987 to $4.5 billion in 1992, an 8% AAGR.

The continuing demand for contracted services is expected to absorb more of the federal IT budget over the remainder of this decade. This growth is reflected in the fact that computer services (processing services, software products, professional services, and turnkey systems) will increase as a percent of the contracted portion of the IT budget from 40%

EXHIBIT II-1

FEDERAL GOVERNMENT: MARKET FORECAST COMPARISON, FY 1987-1992



Average Annual Growth Rate (Percent)	Defense Segment	Civil Segment	Federal Government Sector Total
	11	8	9

Note: Expenditures include industry-specific and cross-industry expenditures to 46% over the forecast period. These specific services and the trends and issues impacting them are discussed below. (Also see Exhibits II-2, II-3, and II-4 for forecasts of the total federal government sector, defense segment, and civil segment, respectively.)

EXHIBIT II-2

FEDERAL GOVERNMENT: INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST BY DELIVERY MODE, FY 1987-1992

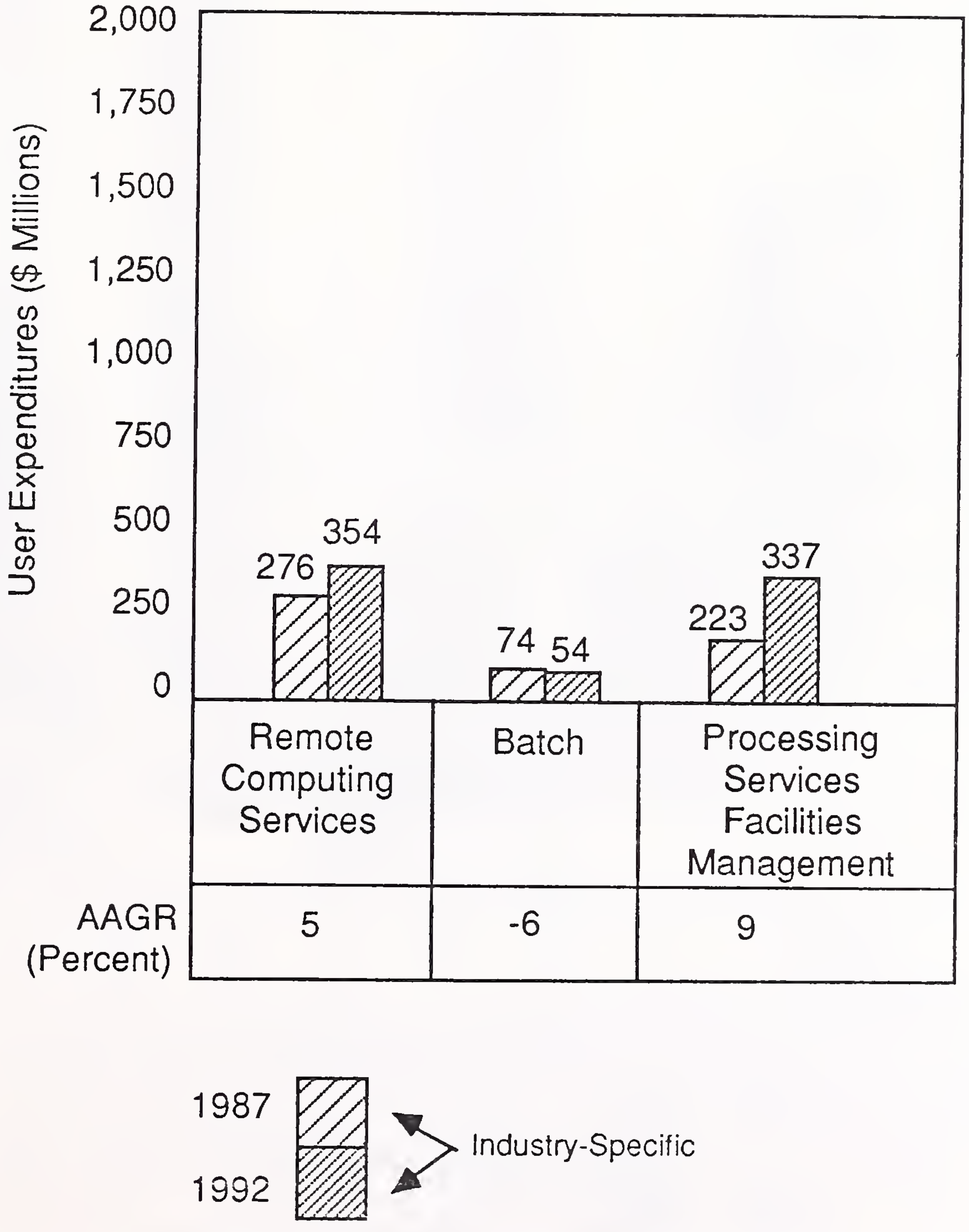


EXHIBIT II-2 (Cont.)

FEDERAL GOVERNMENT: INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST BY DELIVERY MODE, FY 1987-1992 (Cont.)

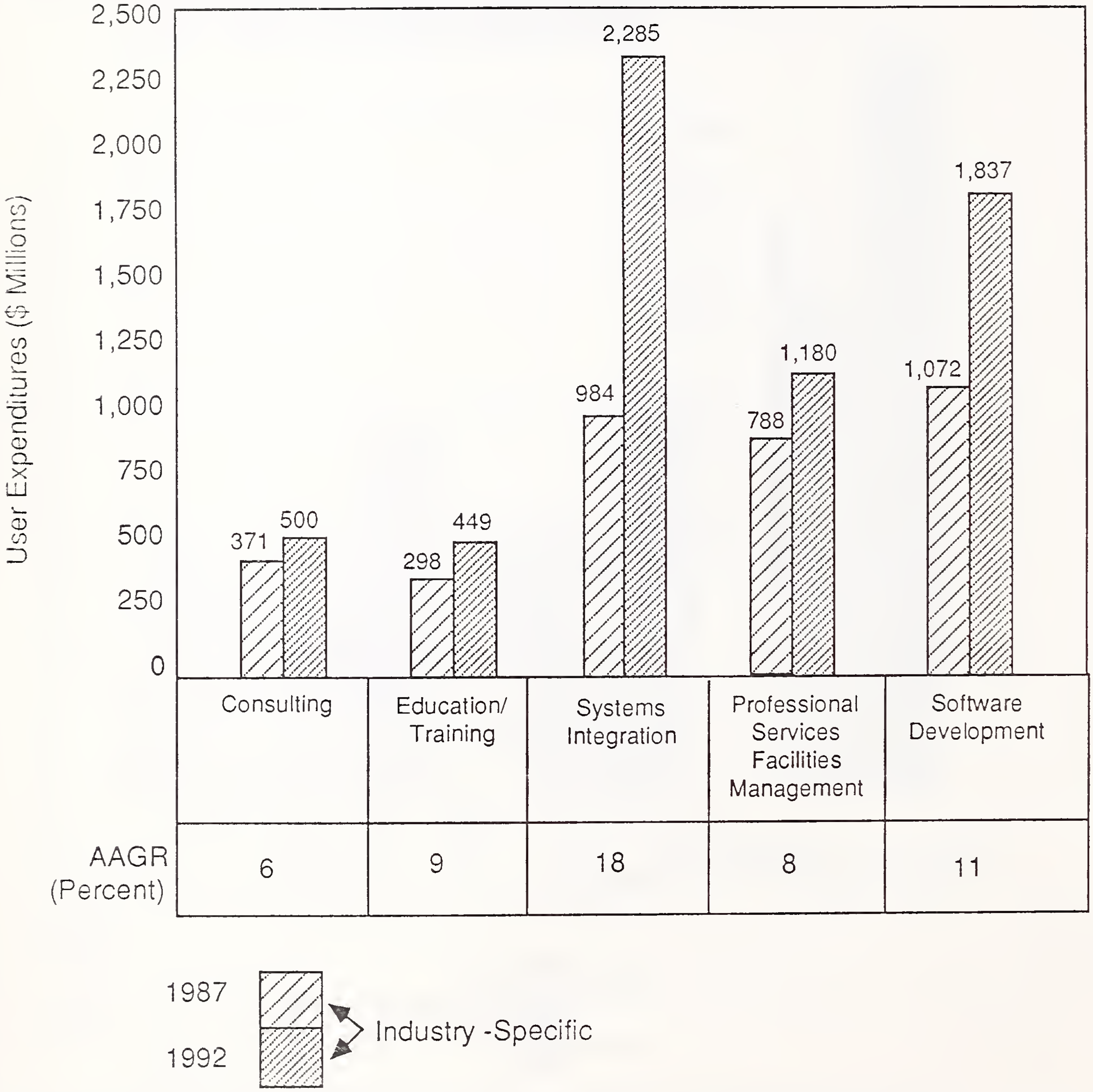
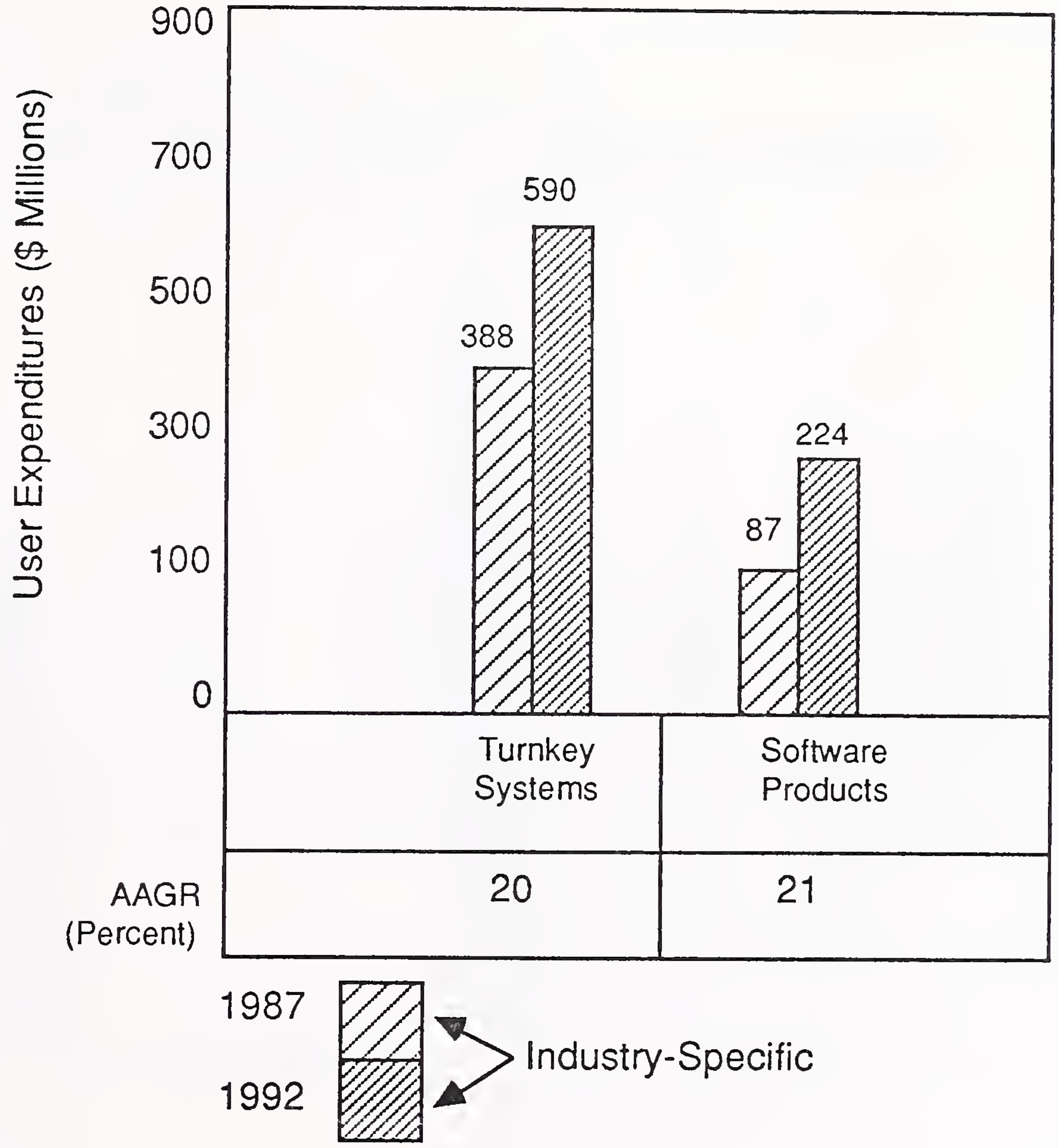


EXHIBIT II-2 (Cont.)

FEDERAL GOVERNMENT: INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST BY DELIVERY MODE, FY 1987-1992 (Cont.)



A Processing Services

The growth rate of processing services has continued to decline. The forecasted AAGR of 5% to 1992 reflects a downward change in expenditures for batch processing (-6% AAGR), modest growth (9%) in facilities management (PFM), and a slower remote computing services (RCS) AAGR of 5%. Civil sector expenditures are about three times the level of the defense sector, but with slightly less prospect for growth.

- Part of the decline in the size of the civil sector is the result of a new accounting of federal RCS business, which now excludes, in INPUT's forecast, the payments made by the federal government to the states for contractor-provided medical and compensation claims processing under the Health Care Finances Administration (HCFA) of the Health and Human Services. Since individual states conduct the competition and award the contracts under HCFA supervision, these expenditures are available only through individual states.

EXHIBIT II-3

FEDERAL GOVERNMENT: DEFENSE SEGMENT USER EXPENDITURE FORECAST BY DELIVERY MODE, FY 1987-1992

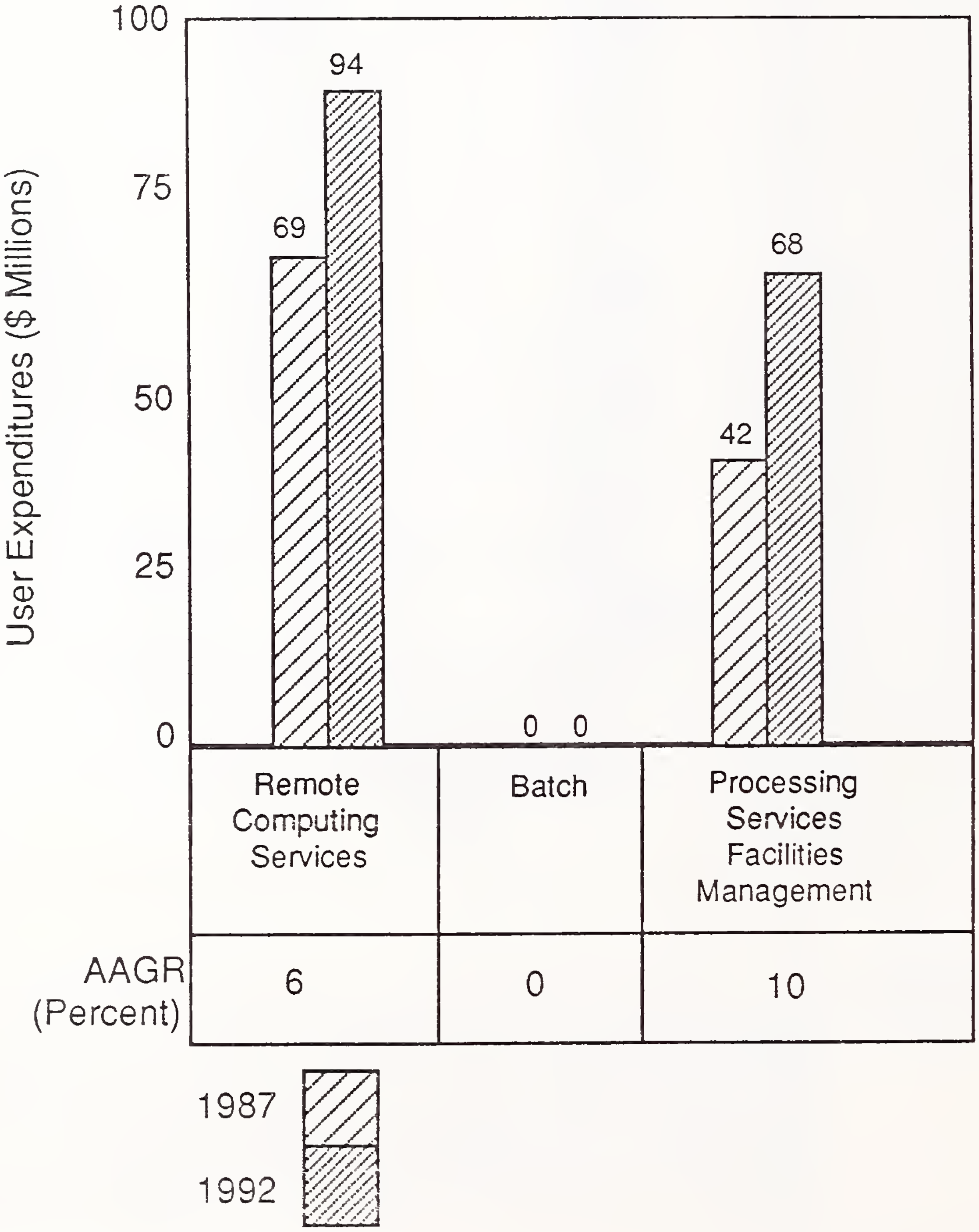


EXHIBIT II-3 (Cont.)

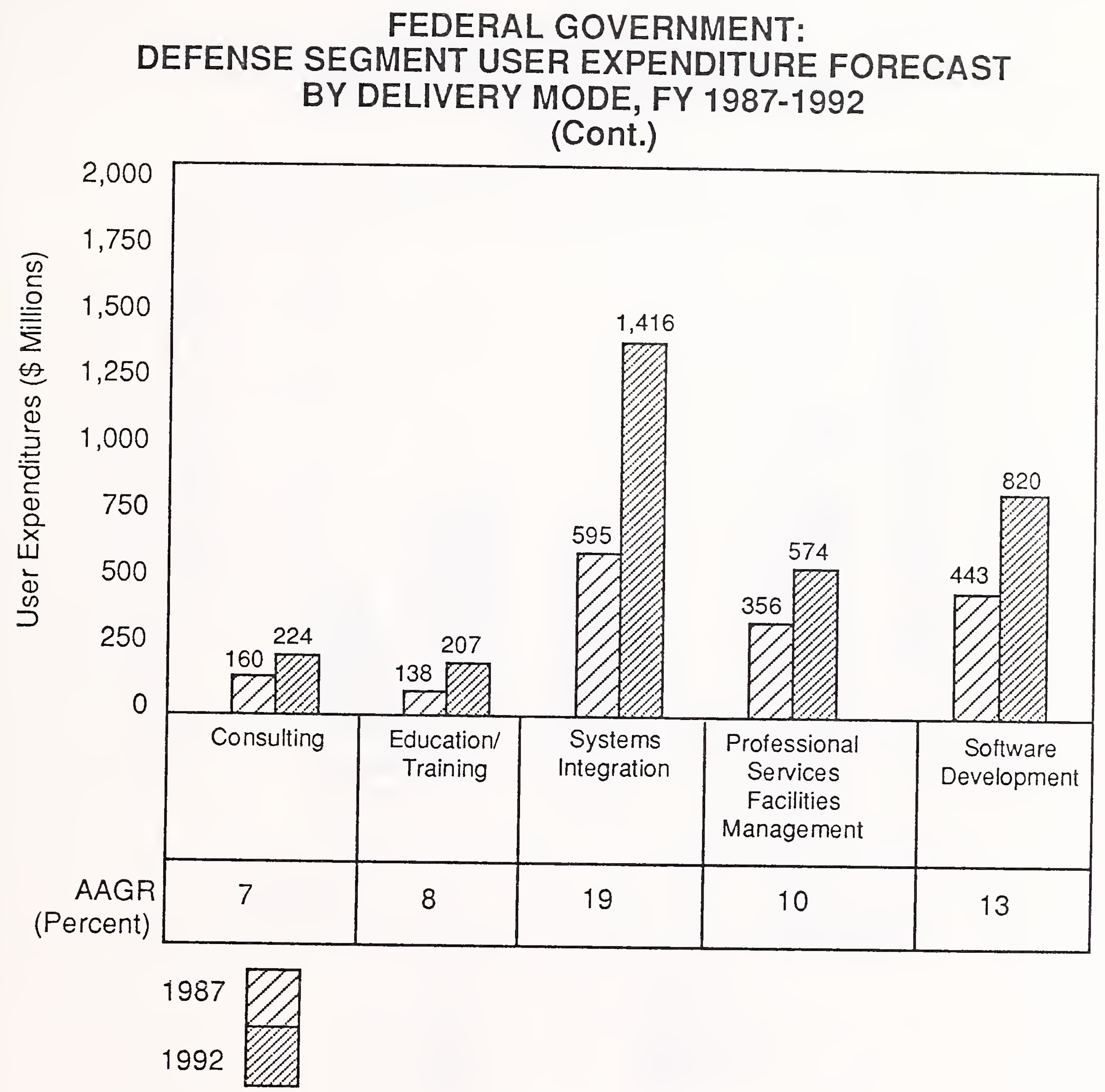


EXHIBIT II-3 (Cont.)

FEDERAL GOVERNMENT: DEFENSE SEGMENT USER EXPENDITURE FORECAST BY DELIVERY MODE, FY 1987-1992 (Cont.)

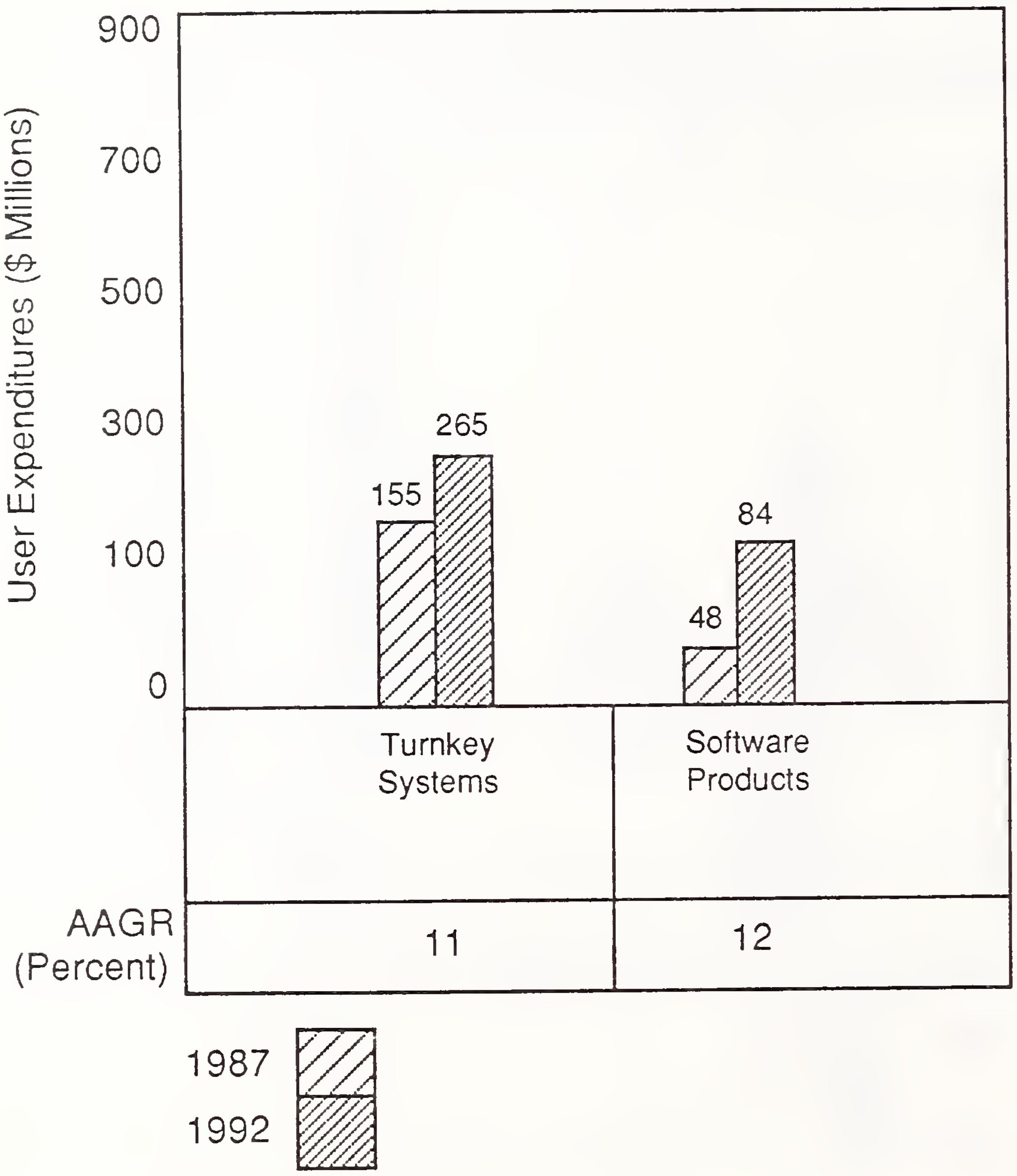


EXHIBIT II-4

FEDERAL GOVERNMENT: CIVIL SEGMENT USER EXPENDITURE FORECAST BY DELIVERY MODE, FY 1987-1992

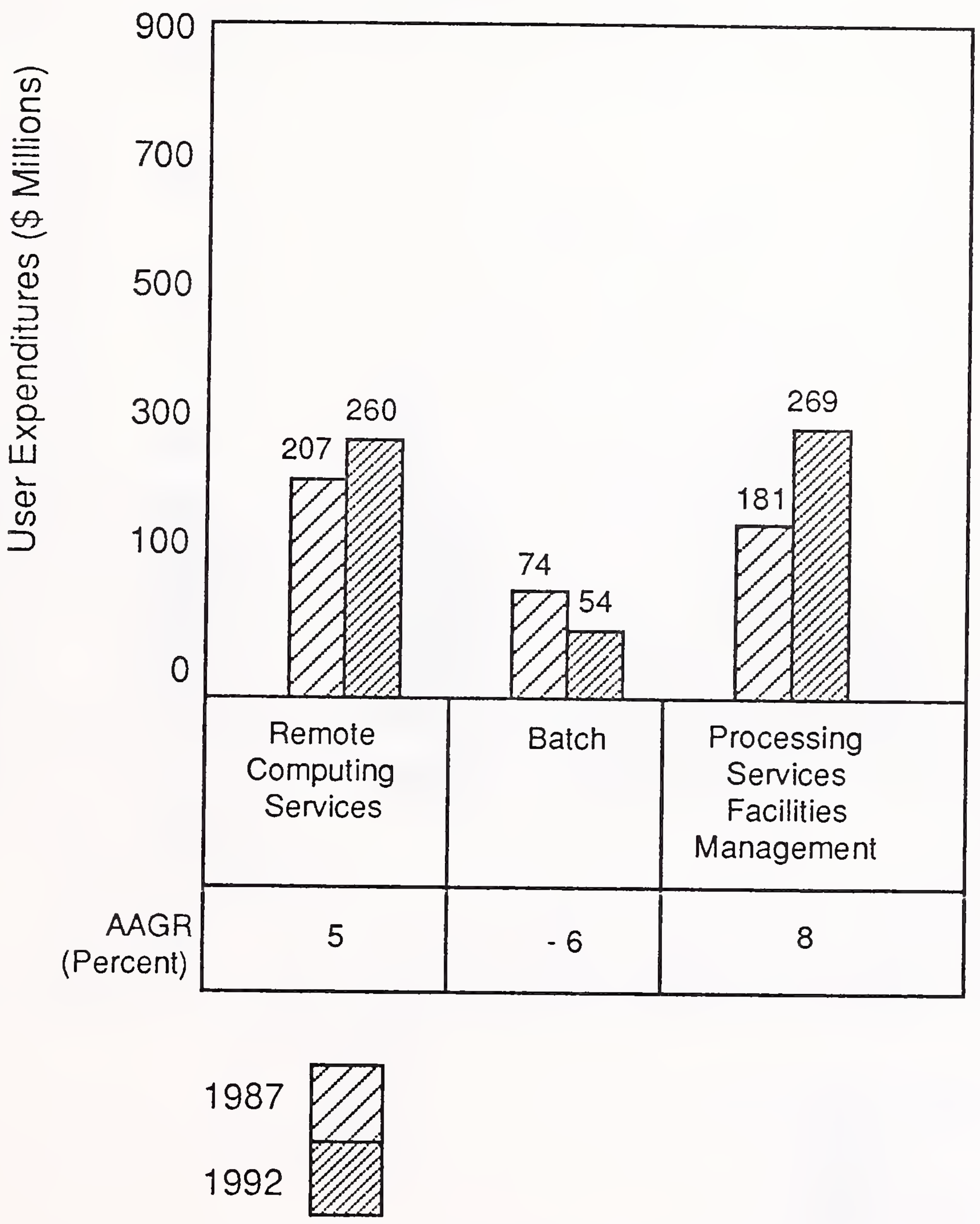


EXHIBIT II-4 (Cont.)

FEDERAL GOVERNMENT: CIVIL SEGMENT USER EXPENDITURE FORECAST BY DELIVERY MODE, FY 1987-1992 (Cont.)

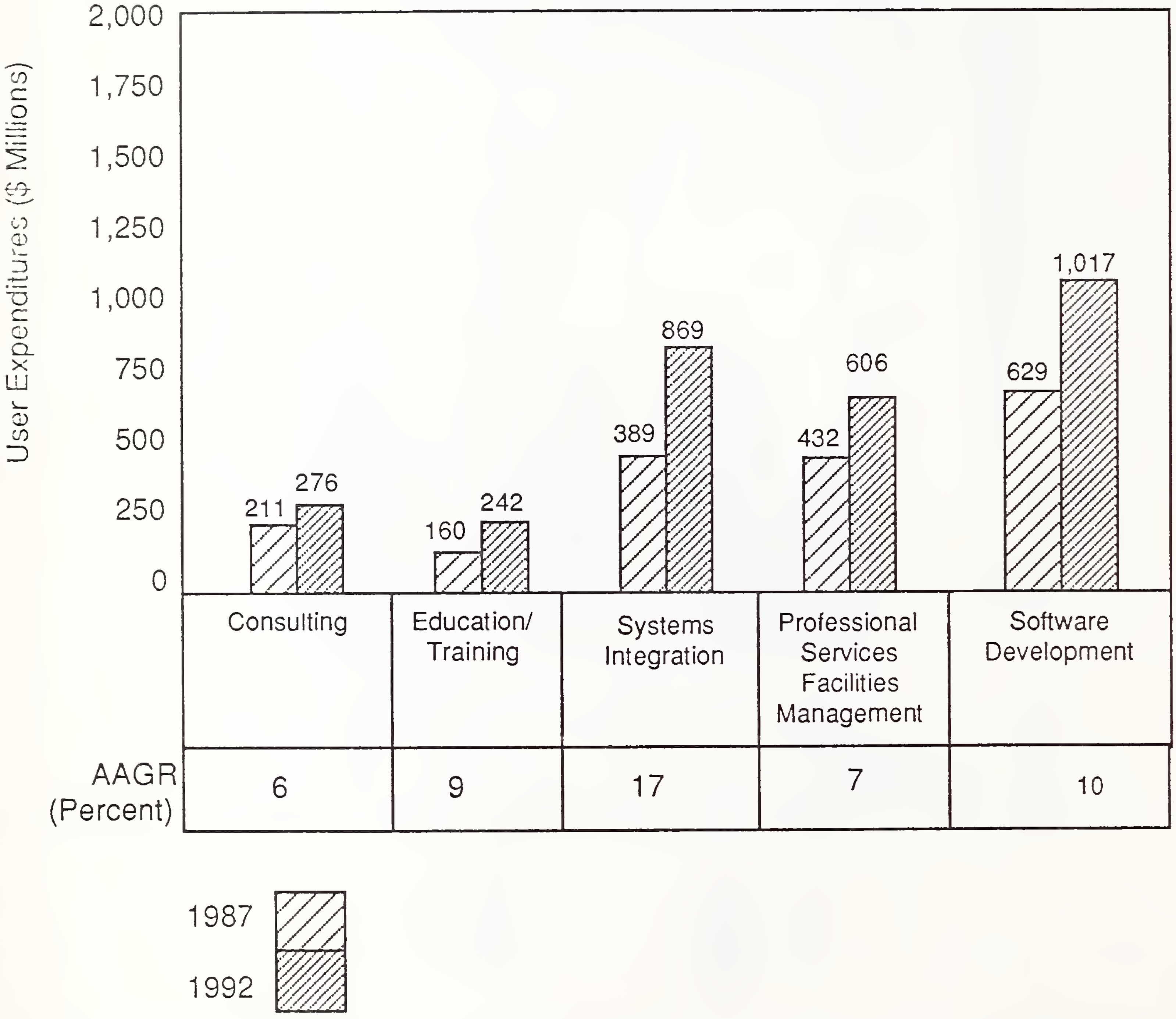
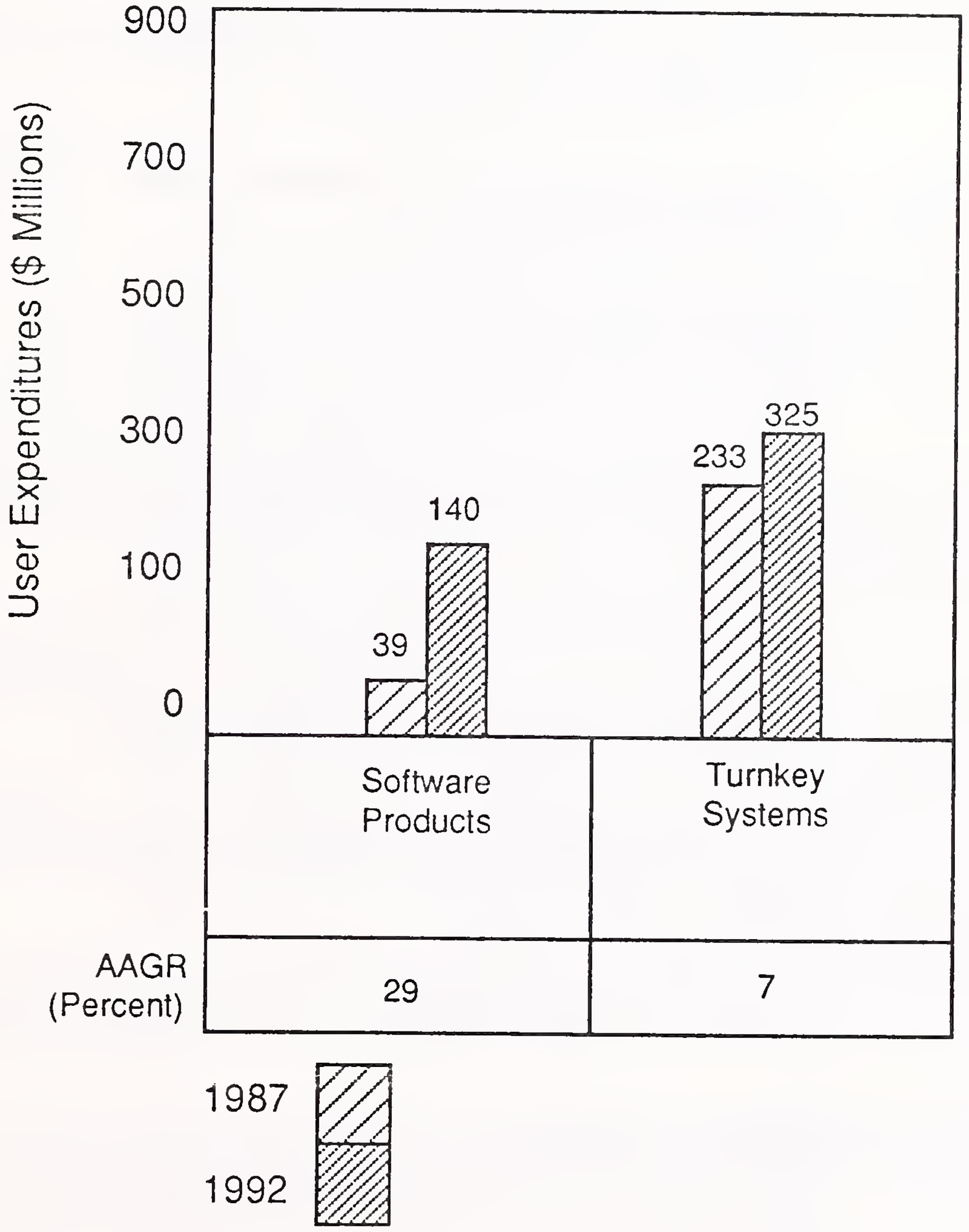


EXHIBIT II-4 (Cont.)

FEDERAL GOVERNMENT: CIVIL SEGMENT USER EXPENDITURE FORECAST BY DELIVERY MODE, FY 1987-1992 (Cont.)



- Since HCFA payments are the only processing expenditures expected to continue to increase, the growth of direct federal processing services will be at a lower rate than previously forecast.

The RCS business has been eroded by several developments:

- The dramatic influx of PCs in the federal workplace has diminished requests for special data manipulation.
  - A PC permits the end user to test various displays without requiring the preparation of task orders.
  - PC networks permit data swapping between end users without data center intervention.
- Perhaps equal in impact on diminishing processing services is the use of PCs by end users in the contracting process itself. Although the GSA has shortened the contracting process from over a year to three to five months, the Teleprocessing Service Program (TSP), including the Multiple Award Schedule (MAS) and Basic Agreements (BA), is generally viewed by agencies as offering a very limited list of potential vendors.
- Although GSA is considering inclusion of VAN and distributed data processing services, under MAS there is no clear indication that users will bear the additional costs of these features.
- Agencies show an increasing preference for purchase of raw computing power under the second part of GSA-sponsored TSP, Basic Agreements.
- The remaining high value that vendors could offer comes from the possible commercialization of existing government data bases.

Batch processing has also fallen prey to microcomputers and similar intelligent workstations. By their nature, batch jobs usually consist of large volumes of data that require minimum manipulation. As such, these jobs are best processed off-line by micro- and mini-based processing approaches. Vendors will need to offer cost-competitive alternatives, such as cheaper workstations, or data acquisition devices.

Processing facilities management (PFM), called contractor-owned/contractor-operated (COCO) FM in the federal government, is a mature market that will remain small but stable into the 1990s. Demand will rise somewhat for an on-line standby capability to provide insurance for catastrophic federal data center failures.

An additional cost problem for vendors is the recent requirement that they obtain a facility security certification to be considered for processing services contracts. The cost of becoming certified, the fact that certification is not a guarantee of any processing business, and the fact that if business is obtained it will be limited to a maximum three-year contract, can limit vendor interest.

To foster more competition, GSA raised the threshold over which agencies must request GSA Delegation of Procurement Authority to offer contracts to vendors. Separately negotiated contracts are now being more actively pursued by both agencies and vendors.

B

Applications Software Products

Expenditures for packaged applications software will increase 21% annually, growing from $87 million in 1987 to $224 million in 1992. Packages that support distributed data processing and DBMS applications should be the most active sales area. Civil agencies will spend slightly more than defense agencies in 1988—$267 million compared to $223 million.

Packaged systems software is generally acquired with hardware systems. About $212 million will be spent in 1988 for data center management and applications development tools. Tools that enhance programmer productivity will be acquired at a greater rate.

A goal of federal agencies is to approach quasi-commercial systems in the use of standard packages. Although in the past agencies felt their requirements were too specific to be met with off-the-shelf applications, the current emphasis is on acquiring commercially available packages and then modifying them via professional services contracts to retain transportability and maintainability as hardware systems evolve. With this strategy agencies hope to limit the high cost of postimplementation changes that frequently occur with custom-developed software when hardware or personnel change.

These packages, and customer-developed software for that matter, will generally be required to be written in standard languages and for standard operating environments.

- OMB is emphasizing the procurement of COBOL-based financial and personnel systems, although some "high tech" elements such as those in Energy, FAA, NASA, and the Geological Survey will continue to require unique languages.

- The Department of Defense (DoD) has reduced the number of supported languages to five. Although Ada is one of the five—being supported as means of solving DoD's weapons programming inefficiencies by providing a language that all programmers know—there appears to be more Ada offerings than opportunities, because the Ada market has yet to take off.

- Only C^3I and weapons systems use special operating systems.

Prequalifying software and discounting are two vendor strategies that have led to increased market share.

- Some vendors are prequalifying their software by providing it to subagencies for beta testing. The vendor then modifies the software to meet subagency requirements, and the product is then placed on a qualified-products list. Subagencies buying software from that list are faced with shorter acquisition cycles.

- DoD is emphasizing multisite licenses to leverage higher discounts.

- Some vendors are rapidly increasing market share by offering discounts for intraagency purchases.

A major concern for vendors is the newly adopted policy governing the licensing of computer software. In an effort to move acquisitions to a purchase basis, all software currently rented by the government must have been purchased or converted to a Lease-To-Ownership-Plan (LTOP) effective December 31, 1986. Contracts involving installed rental (without automatic ownership) will not be extended or renewed for any period. Rental for new business will no longer be solicited.

LTOP provides for mandatory "purchase option credits" to be accrued to software under license. After a specified period of time, a fully paid, nonexclusive perpetual license for the software product automatically accrues to the government.

Several vendors submitted formal protests to GSA regarding the policy, citing the reductions in competition the policy will likely create as vendors refuse to do business under GSA's terms, the policy's oversight of recurring costs (maintenance and support) usually included in the license fee, and the government's failure to comply with its own requirement that vendors be provided an opportunity to comment before the implementation of any significant policy change. GSA's Board of Contract Appeals determined that sufficient competition exists to support the government's right to insist on ownership or perpetual licenses.

C
Professional Services

INPUT estimates that the federal government professional services market will increase from $3.5 billion in 1987 to $6.3 billion in 1992, an average annual growth rate of 12%. The need for contractor assistance to support the federal government's ADP rebuilding goals will continue to make the federal government professional services the largest single externally contracted information services segment of the federal sector. The principal components of this market are:

- Software development, also called programming and analysis in the federal sector.

- Systems integration, which includes subsets of consulting, design, engineering, and analysis.

- Facilities management of government owned or leased automatic data processing equipment (ADPE), which includes vendor operation, maintenance, and, sometimes, overall resource management.

- Design and consulting, ranging from special studies to the preparation of specifications of information technology resources required to meet specific government needs.

- Education and training of managers, professionals, and technicians using a range of resources that varies from manuals to computer-based education in automatic data processing.

1. Programming and Analysis/ Software Development

Programming and analysis services, also called software development, include:

- Hardware and/or software system design.
- Custom software development.
- Modification of commercial software products.
- Software testing of custom and commercial packages.
- Software conversion.
- Maintenance of operating and applications software.
- Independent verification and validation (IV&V) of software packages prepared by other vendors.

This service mode is expected to be the second fastest growing during the forecast period, at an AAGR of 11%, and is the largest submode in professional services. The current and continuing shortfall in programming skills of the federal government sector is the most significant factor behind the projected growth. Government staffing limits and the backlog of software maintenance tasks of most government data centers also contribute to the demand for vendor assistance in this service mode.

There is a commitment to maintain and increase the effectiveness of existing software. The major trend will be to buy more off-the-shelf packages and use professional services to modify the packages to suit unique needs.

This segment will remain strong until the agencies retrain or replace their current staffs and resolve the software maintenance problems associated with earlier custom software practices and manual software development procedures.

2. Consulting Services

Consulting services in the federal market provide support to information systems and/or services. Examples of government consulting service contracts are:

- Feasibility studies.
- ADP requirements analyses.
- Systems audits.
- System Engineering and Technical Direction (SETD).
- System Engineering and Technical Assistance (SETA).

Consulting services are expected to increase from $371 million in 1987 to $500 million by 1992, an AAGR of 6%. The primary growth factor is the need of agencies for assistance in producing the technical justification for planned improvements in information technology resources during this period. The agencies are understaffed in the technical planning and evaluation areas.

3. Education and Training

Education and training services relate to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming, and software maintenance. The government normally contracts for:

- Training programs.
- Books and manuals.
- Seminars.
- Automated training systems.

This submode is expected to attain an AAGR of 9% over the 1987-1992 period. The principal focus of training will be the large number of fourth generation replacement systems of ADP architectures of the IBM System 360-370 era. The dynamics of end-user computing, local area networks, distributed processing, and new software will require retraining of more than half of the current agency ADP workforce.

4. Systems Integration

This service area will grow at an 18% AAGR from $984 million in 1987 to $2.29 billion in 1992. Nearly two-thirds of the expenditures will come from the Defense sector.

Systems integration (SI) tasks that may be contracted in this submode include:

- Systems Engineering and Integration (SE&I).
- Systems Engineering and Technical Assistance (SETA).
- Systems Integration (SI).
- Systems Work Packages (SWP).
- Hardware (and operating systems software) products.

SI is usually associated with custom hardware/software projects, particularly with high-risk efforts such as substantial system upgrades and replacements.

The newer projects include the design and provision of networks to interconnect the main site and off-site components correctly, including appropriate transmission media and supervision equipment.

Substantial education and training efforts, especially where the project involves the replacement of second- or early third-generation systems, have been planned for most of the large programs.

Post-implementation support after the initial system goes on-line will be required to incorporate later changes and to maintain the system until the in-house staff can be trained to the new system level.

The different forms of contracts found in SI awards reflect the government's desire for risk-reduction contracting to lessen "surprises" and reduce the frequent "bad press" associated with large overruns and system failures.

5. Facilities Management/ Operations and Maintenance

Professional services facilities management (PSFM) is also referred to as government-owned/contractor-operated (GOCO). GOCO also includes standalone operations and maintenance (O&M) contracts, which differ from PSFM in that they have less or no direct management /control of the facility. The computing equipment is owned or leased by the government, not the PSFM or O&M vendor; the vendor provides the staff to operate, maintain, and manage the government's facility. Typical contract tasks include:

- Operation, maintenance, and management.
- Operation and maintenance.
- Hardware maintenance.
- Third-party maintenance.
- Software maintenance.
- Site preparation and installation.

This submode is considered a mature market in the federal government. The currently projected AAGR is 8% between 1987 and 1992, reaching the $1.2 billion level in 1992. The civil sector holds an edge in expenditures, but this gap will narrow as the defense sector grows at a 10% AAGR, compared to a 7% civil sector rate. This service could pick up in the outyears of the budget if the ADP workload continues to increase without a corresponding increase in staff.

D
Turnkey Systems

Prepackaged hardware and software products, usually designed to program specific functions, are expected to grow at a 9% AAGR, from $388 million in 1987 to $590 million in 1992.

As in other vertical markets, turnkey systems vendors to the federal government provide the entire system, including applications software and special peripherals, installation of the system, training of client personnel to operate it, and provision of service during the warranty period.

Federal agencies are developing interest in a wide range of packaged systems.

Defense groups in both DoD and DoE actively support the application of computers in aerospace, weapons, vehicles, and hazardous product facilities.

The Defense Department is particularly interested in computer-based trainers and simulators for electronic-device maintenance, including use of videotapes and videodisks.

All agencies are looking for improved graphics generation and automated mapping applications that produce master drawing files for ships and output for tactical reconnaissance missions and intelligence applications.

Cargo and transport scheduling systems, similar to those for industrial truck and ship dispatching, are directly applicable to the needs of a number of agencies.

E
Demographic Analysis

Exhibit II-5 depicts characteristics of the federal government segment and the defense and civil sectors. As noted earlier, this segment is best characterized by its sheer size in terms of space occupied, number of employees, and number of computers.

In addition to the large, well-populated facilities in the greater Washington, D.C. area, the federal government has established a number of large service centers or enclaves in major cities as well as large military installations. All of these centers employ substantial ADP capability but use contractor support for overloads and major hardware and software improvements.

The largest concentrations of ADPE and its supporting IT workforce are associated with defense, intelligence, citizen services, revenue services, and enforcement.

EXHIBIT II-5

FEDERAL GOVERNMENT: DEMOGRAPHIC ANALYSIS

DESCRIPTOR	SECTOR		TOTAL FEDERAL GOVERNMENT
	DEFENSE	CIVIL	
Buildings "Owned"*** (Thousands)	323	115	438
Occupied Space*** (Millions of Square Feet)	1,929	796	2,725
Employees in 1987* (Thousands)	1,039	1,075	2,114
Revenue Receipts †† ($Billions)			917
Outlays †† ($Billions)	298	726	1,024
Information Technology Budget †† ($ Billions)	8.1	10.8	19
Government Information Technology Workforce† (Thousands)			128
Computers** (Thousands)			22.6

* Excludes 764,590 Postal Service Employees

** Excludes Computers Costing Less than $50,000, as of 1986

*** 1986

† Expressed in FTE (Full-Time Equivalent Employees) in 1988

†† Government Fiscal Year 1988

- Defense IT aggregations are involved in command, logistics, administration, and research.
- Citizen services include Social Security, welfare, health services, recreation, and Veterans affairs.
- Revenue includes most of the Treasury's activities.

By the early 1980s, more than half of the federal inventory of ADPE was made up of minicomputers, that were acquired over the 1978-1982 period. Enhancement of these installations has been a major focus since 1984.

Department of Labor (DoL) and DoD statistics have suggested that more than half of the ADP workforce has not been trained beyond third-generation software and systems. Most ADP education expenditures in the past two years have focused on end-user computing for non-ADP personnel. Salary and job mobility limitations of federal civil service employment are considered prime movers for erosion of the the in-house ADP workforce.

The government IT workforce statistic excludes military and intelligence ADP specialists. Demands for programmer support of embedded and mission-critical computer services, which are excluded from this market analysis, have been projected by government sources at greater than 900,000 unless substantial gains are made in productivity and automation.

III

Competitive Developments

III

Competitive Developments

Vendors of services and software to the federal government, in general, may be categorized by their exclusivity with federal clients.

- At the one end of the continuum are firms, typically small in revenue size, who work almost exclusively on federal contracts. Many of these firms have expertise in such services as design and engineering or are known for their "body shop" programming and analysis capabilities. This group also includes several major "Not for Profit" firms, colleges and universities, and in-house government data centers with excess capacity, all of whom compete with commercial federal contractors.
- The middle group on the continuum tends to be very large contractors who have very large and separate commercial and federal operations. Although some of these vendors provide a single type of service, most are capable of providing "full service," either by themselves or in concert with one or more partners.
- At the other end of this continuum are vendors who have a federal presence, but whose presence is secondary to a commercial line of business. That is, these vendors contract with the federal government because of a capability, not because they have *a priori* selected the federal marketplace.

Most of the largest vendors to the government are part of the middle group. They derive a significant percentage of their total professional services revenue either directly from the federal government or as subcontractors to other companies performing work under government contracts.

- This dependency upon the federal government has had a profound effect upon vendors' earnings, management, organizational structure, employees, and the commercial market.

- These government vendors, as well as larger vendors in the first group, tend to attract and recruit into their management ranks a high proportion of ex-government employees who understand how to navigate the complexities and deal with the competitiveness of government procurements.

- These vendors also enjoy a high rate of systems enhancements, extensions, and maintenance contract awards associated with initial awards. Many of these follow-on contracts are awarded on a sole-source, noncompetitive basis due to the vendor's unique experience and knowledge of the recently completed system.

- But all federal contractors, and this group in particular, face an increasingly competitive environment.

Small businesses, minority-owned businesses, and large aerospace vendors represent three types of new competitors that have come to this market from nontraditional quarters.

A

Processing Services

The federal processing service market has matured within the past few years in response to a number of technological and strategic changes.

- The ten leading vendors in the federal market are ranked in Exhibit III-1.
  - The top five vendors on the chart account for more than 60% of the expenditures, and the top ten account for more than 78% of the federal market.
  - Several of the leading vendors have acquired smaller vendors and their contracts, thereby increasing their share of the market.
  - Most of the leading vendors offer two or three of the processing submodes of RCS, batch, and facilities management.
- The market has become increasingly price-sensitive as agencies increase ADP volume without a corresponding budget increase.
  - Agencies tend to buy raw computing power under Basic Agreements (BA) in preference to the more expensive, technically supported Multiple Award Schedule Contracts (MASC).
  - Billing algorithms are coming under increasing GSA and GAO scrutiny through in-process audits.
  - GSA is pressuring vendors for larger discounts without guarantees of appropriate transaction volume.

EXHIBIT III-1

RANKING OF TOP FEDERAL PROCESSING SERVICES VENDORS

COMPANY	RANK*
Boeing	1
CDC	2
CSC Infonet	3
MMDS	4
GEISCO	5
McDonnell Douglas/ Tymshare	6
AMS	7
DRI	8
COMNET	9
ITT Dialcom	10

*Based on 1986 Annual Revenues

- Vendors in this market must employ certain strategies to retain their current market share. These strategies include:
  - Offering supported and unsupported computer time schedules.
  - Qualifying for both MASC and BA under the Teleprocessing Services Program.
  - Maximizing client interface for specialized ADP services that can become the basis for a contract outside the TSP.
  - Providing services to systems integration contractors without RCS facilities to add revenue.
  - Tracking all competitors for opportunities to replace their offerings.

B Facilities Management Services

Facilities management (FM) services are offered in both the processing and professional services modes. A number of vendors provide FM in both modes to the federal government, as indicated in Exhibit III-2.

- As noted in the Exhibit, 16 vendors provided the top 10 market shares in the two FM submodes. Most of these vendors have been providing FM services for a number of years, indicating the need for experience in pricing and managing federal FM projects.
- This market has matured, with a characteristic decline in growth rate and the number of opportunities. Most of the latter are recompetitions of existing contracts.
  - This market is expected to flatten, if not decline, under the early phases of the Gramm-Rudman Act.
  - If the Act or substitute deficit reduction measures remain in force until 1990, this market could increase in the 1988-1990 era as a cost-effective substitute for federal employees.
- The strategies for winning awards and fiscal viability after an award are simplistic, but require rigorous enforcement.
  - Top-notch managers with the capacity for wide span-of-control techniques are essential to reducing overhead.
  - Everyone on the program must be direct-charged, including secretaries, clerks, and drivers, to keep the overhead down.
  - Fringe benefits must be reduced to the legal minimum, since some federal features (number of holidays, for example) are expensive overhead charges.
  - Job descriptions should just meet wage comparison levels of the Department of Labor wage surveys.
  - Separate entities should be used for FM work to employ minimum overhead, G&A, and fee rates.
- The most significant benefit of FM services in the federal market is contract lifetimes. The typical agreement runs for three to five years, with a high incidence of winning the recompetitions. The strategies for winning the contract again include:
  - High performance rating of ongoing work.
  - Workforce stability (minimal turnover).

EXHIBIT III-2

RANKING OF TOP FEDERAL FACILITIES MANAGEMENT VENDORS

COMPANY	PROCESSING FM RANK	PROFESSIONAL SERVICES FM RANK
Electronic Data Systems	1	8
Boeing Computer Services	2	2
Computer Sciences Corporation	3	1
McDonnell Douglas	4	-
Comnet	5	-
TDC	6	-
ADP	7	-
CDC	8	-
GEISCO	9	-
Sterling Software	10	10
LEMSCO (Lockheed)	-	3
UNISYS	-	4
Planning Research Corporation/Kentron	-	5
Martin Marietta	-	6
Bendix Services	-	7
Dynalectron (Dyncorp)	-	9

  - Tight cost control to minimize cost creep.
  - Bidding what the Request for Proposal (RFP) requires (not what the staff believes).

C
Professional Services

The federal government is the largest customer of professional services and thereby attracts the widest range of vendors by size and specialization. Exhibit III-3 indicates the ten leading vendors by market share to the extent that this portion of their federal revenues is identifiable.

- The market is dominated by system houses and hardware firms.

  - These firms require a broad range of in-house or consultant skills to meet systems integration and implementation requirements.

  - Hardware firms are providing systems employing other company hardware that best meets client needs (and price).

  - The systems integration and software development submodes are the largest of the five submodes.

- Competition in the professional services arena is complicated by the continually changing pattern of vendor teams for different programs. Today's bidding partners are tomorrow's competitors and vice versa.

- Bidding strategies for this mode are different from others, except for FM, which was discussed earlier.

  - A primary requirement is availability and commitment of key qualified managers and professionals.

  - There is an increasing tendency toward the use of fixed-price bids on late development and the implementation phases of new or replacement systems.

  - Some specialized small businesses, consulting firms, and academic groups are the key to an award in cases where the agency believes they have the requisite background or functional experience.

  - In-depth support of the main body of employees and managers can be a key criterion.

  - Reputation has high value in this service mode, especially for cost control, management commitment, staff quality, and availability.

  - Knowledge of available and applicable software packages that can be fitted to agency requirements can be a deciding factor in some bids.

EXHIBIT III-3

RANKING OF TOP FEDERAL PROFESSIONAL SERVICES VENDORS

COMPANY	RANK
Computer Sciences Corp.	1
Martin Marietta Data Systems	2
General Motors/Electronic Data Systems	3
Planning Research Corp.	4
BDM International	5
International Business Machines (IBM)	6
UNISYS	7
Science Applications International Corp.	8
Arthur Andersen	9
American Management Systems	10

- A thorough knowledge of government contracting procedures, audit requirements, and bid evaluation processes is essential to maximize proposal scores for negotiated procurements.

- In-depth knowledge of, and exposure to, agency mission and system functional requirements are important elements for establishing credibility with the potential client.

D

Software Products

The software products market of the federal government has demonstrated the same softness in 1987 as the commercial market.

- The independent software package vendors (excluding computer manufacturers) are ranked by market share in Exhibit III-4.
- This ranking includes systems and applications software products.
- The federal agencies buy about 40% of their software and lease the remainder.
  - GSA and DoD are concerned about and demand proof of vendor maintenance of software, regardless of installed location.
  - Some agencies oppose acquisition of copyright-protected software.
- Key strategies for selling software products in the federal arena are not uniformly practiced by all of the successful vendors, but some combinations apply.
  - Discounts for multiple sites within an agency are important.
  - Discounts for multiple agencies within a cabinet-level department also apply.
  - BETA testing of applicable products by key agencies permits placement on the Qualified Products List (QPL) for future accelerated acquisition.
  - Qualification for the GSA Federal Supply Schedules (FSS) sometimes permits uncontested acquisition in small lots. (The "ground rules" for an FSS annual agreement have some serious drawbacks, however.)
    - The vendor must offer product/service discounts as large as those received by the vendor's "best customer," including foreign clients.
    - The vendor must offer a purchase plan or permanent license after a specified rental period.
    - The vendor must offer post-installation service and support on a nearly universal basis.
  - Demonstrated postimplementation support, especially of the "Quick Reaction" (QR) type.

EXHIBIT III-4

RANKING OF INDEPENDENT FEDERAL SOFTWARE PRODUCTS VENDORS

COMPANY	RANK
Software AG	1
ADR (Ameritech)	2
Computer Associates*	3
CINCOM	4
UCCEL*	5
Information Builders	6
Sterling Software	7
Sage Software	8
Oracle	9
Mathematica, (On-line Software Intl.)	10
Pansophic	11

* Merged in 1987

- Availability of the package for several host machines, especially for agencies with a variety of CPUs.

- A continuing client education program to "let them know your products' capabilities." (There is some brand name loyalty evident.)

E
Turnkey Systems

Turnkey systems have a limited popularity in federal circles. Most of the requirements are described as government-unique, but really only deal with unique or sensitive data. Some areas of government activity have employed small- to mid-sized turnkey systems of the kinds provided by the vendors listed in Exhibit III-5.

- Some vendors sell multiple systems to a few agencies, and others sell a specific system to a number of agencies.
    - CAD/CAM applications are principally defense- and energy-oriented.
    - Graphics and drawing control systems have wide applications across a number of agencies.
    - Training systems are heavily concentrated in DoD and NASA, but other agencies are experimenting with trainers and simulators.
- Strategies for success in this service mode vary widely, but all tie to the need to identify a requirement that is not unique. The latter is best satisfied by custom system designs.
    - The application needs some flexibility in input, storage, and output characteristics.
    - Value-added design and software, complete with training and maintenance documentation, are keys to successful sales.
    - Fixed-price sales are essential for leverage, but discounts will be needed to entice large buys.
    - Investment recovery needs to be spread over a number of systems to be competitive.
    - Education of agency technical personnel is essential to provide access and to minimize competition from custom vendors.
    - System houses can be a hidden source of business when they can incorporate turnkey systems in large configurations.

EXHIBIT III-5

RANKING OF TOP FEDERAL TURNKEY SYSTEMS VENDORS

COMPANY	RANK
Federal Data	1
C3, Inc.	2
Computervision	3
Prime	4
Intergraph, Inc.	5
Computer Consoles	6
Gould	7
Harris	8
Tektronix, Inc.	9
Triad	10

IV

Federal Government Information Technology Budget Outlook

IV

Federal Government Information Technology Budget Outlook

A
IT Budget Components

The Information Technology (IT) budget that supports the various departments' missions may be categorized in terms of the basic components needed to acquire and operate Automatic Data Processing (ADP), namely capital investments, commercial services, operating support, and personnel. These categories and their respective shares of the 1988 IT budget are displayed in Exhibit IV-1.

The types of activities supported under each of these categories are as follows:

- Capital Investments. The lease or purchase of all ADP equipment, telecommunications equipment, software, and physical facilities, excluding embedded computers and classified systems.

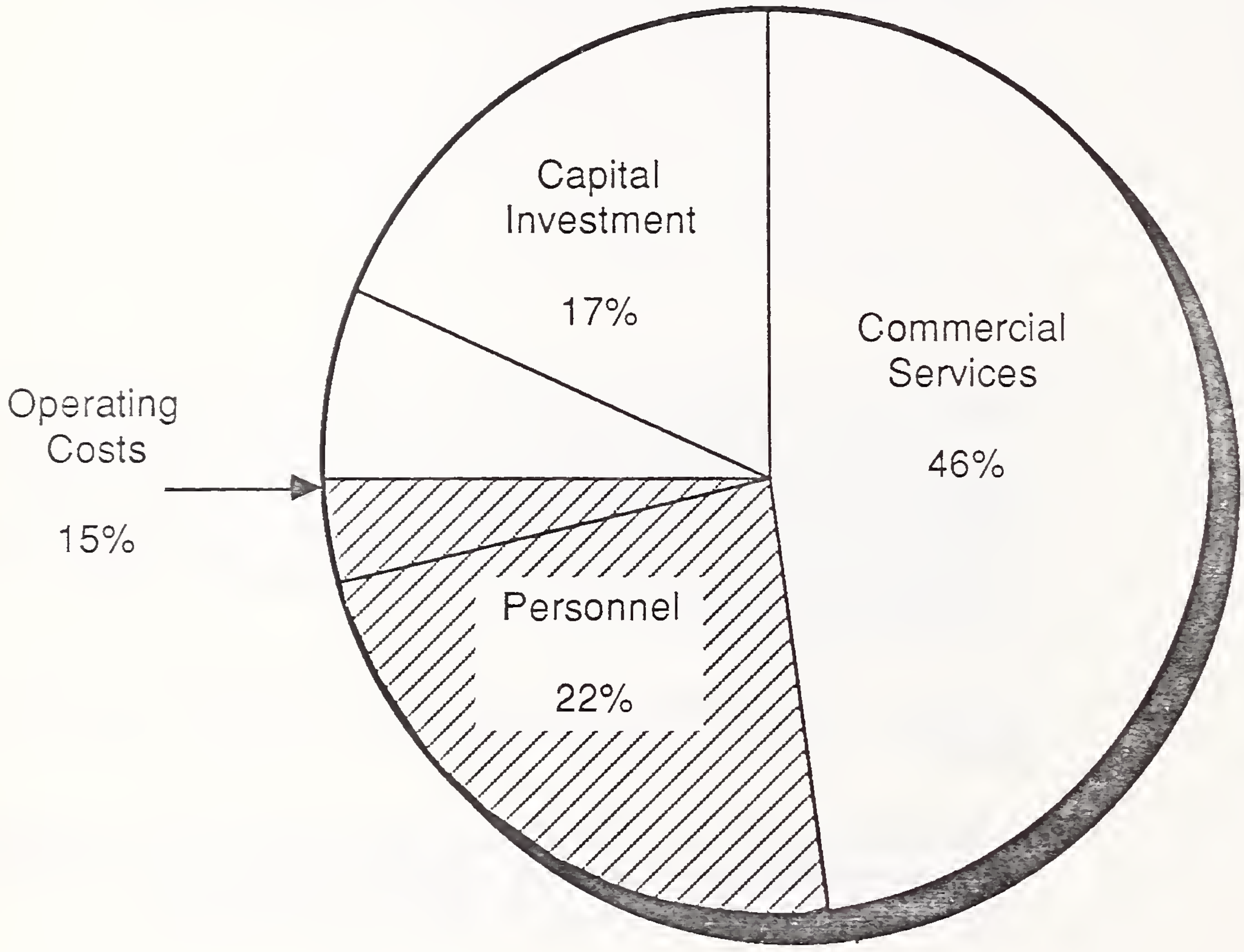
- Commercial Services. Timesharing services, telecommunications services, facilities management systems design and software development, consulting, software/hardware maintenance, education and training, and other external costs, including requirements analysis, risk analysis, and studies of advanced technology.

- Equipment Lease and Operating Costs. Day-to-day costs of operating information systems, including lease of hardware and software.

- Personnel. Salary, benefits, and travel costs associated with personnel employed directly by the government.

EXHIBIT IV-1

FEDERAL GOVERNMENT INFORMATION TECHNOLOGY BUDGET
GFY 1988



Obligations = $18.9 Billion

Contracts = $12.7 Billion (67%)

☐ External Contracts

▨ In-House

Source: OMB A-11 S43 for FY 1988

B

Changes in the IT Budget

As a percentage of the total federal government budget, the 1988 IT budget of $19 billion represents 1.6%. This is about the same proportion as in 1987. Prior years (1982-1985) saw a 33% increase in this fraction.

Although the total IT budget has increased 43% in constant dollars since 1982, the period of rapid growth ended in 1985 with a 20% increase over the previous year. The 1988 increase over 1987 will be 8%.

Increases by type of program are not equal, but rather reflect the current administration's priorities.

- National Security and International Affairs Programs, representing over 50% of the total IT budget, will increase 5% over 1985.
- Economic and Government Administration will increase 1.3%.
- Human Resources, Veterans, and Labor Programs will increase 0.1%.
- Natural Reserves, Energy, and Science efforts will increase 7.1%.

By budget category, the portion of the IT budget available for contracting will decrease to 67%, whereas the in-house portion will begin to increase. The slowest growth area will be capital investment, which will decrease only 3% from the 1987 level.

C

IT Services Contracting Forecast

Exhibit IV-2 depicts the contracted information services portion of the IT budget in more detail and provides a forecast by major markets through 1992.

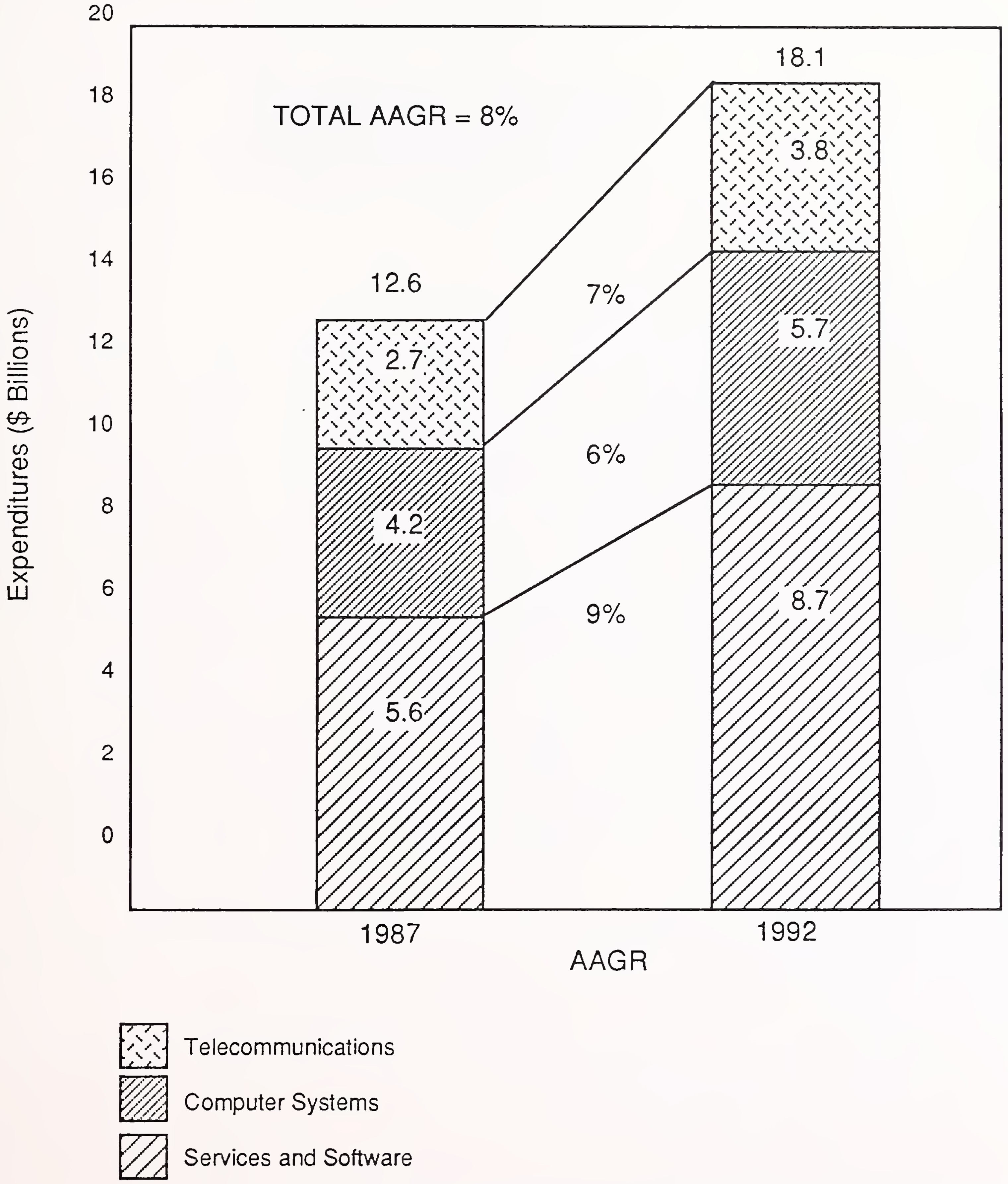
- Although all markets will bear the impact of slower growth in the IT budget—currently forecast at 8% annually—computer systems acquisitions will show the smallest annual growth (6% AAGR). After heavy investments in acquiring, upgrading, or replacing major systems in recent years, only low- and high-end systems will enjoy increased expenditures.
  - At the low end, the government anticipates acquiring over 300,000 microcomputers by 1990.
  - Similarly, at the high end, over 100 supercomputer acquisitions are anticipated for use in the Strategic Defense Initiative ("Star Wars"), weapons research, energy, scientific investigations, weather forecasting, and national laboratories.
- On the other hand, telecommunications, services, and software will grow faster. Telecommunications expenditures will increase as the

government puts in place a new federal system (FTS-2000) to hold the line on rising telecommunications costs created, in part, by the forced divestiture of AT&T.

- Services and software expenditures, the focus of this report, will increase at 9% average annual growth rate (AAGR) in response to agencies' needs to address requirements for increased efficiencies in the face of a shrinking in-house workforce.

EXHIBIT IV-2

FEDERAL GOVERNMENT INFORMATION TECHNOLOGY MARKET GFY 1987-1992



Note: Expenditures budgeted are for industry-specific and cross-industry expenditures

V

Federal Market Opportunities

V

Federal Market Opportunities

A Application Targets

There are different application needs within an agency and between agencies.

- Major opportunities exist for applications that provide new management information systems. These applications represent upgrades or expansions of capabilities relating to day-to-day operations of federal ADP and represent at least one-fifth of the different application needs of both civil and defense agencies.
- Data management capabilities and data base management systems will become particularly popular as agencies attempt to organize their information resources to meet the ever-growing end-user demands. DoD agencies in particular will require applications in this area.
- Administrative and logistics systems are required to bring these types of applications up to a level of efficiency realized in the commercial marketplace. Although often believed to be an application indigenous to DoD, civil agencies seem to require even more support in this area.
- With increasing congressional pressure on agencies to institute better money management practices, financial management and budget applications have also become target initiatives, particularly in civil agencies.
- Scientific applications are most prevalent in space exploration, energy, weapons development, physical science projects of DoD, Commerce, NASA, and Energy.
- Office automation applications, while commanding a smaller share of the various applications, should be particularly fruitful for vendors who offer solutions for the integration of incompatible hardware and the need for increased end-user support.

B

Software Management

A particular concern surrounding these application targets is software management.

- More than 60 cents of every federal dollar spent on data processing is spent on software. Between 36 and 42 cents of that software expenditure are spent just to maintain existing custom software systems. Agencies are being pressured by budget restrictions to acquire improved software maintenance tools to reduce the large personnel costs associated with maintenance.

- The government has some unique data processing needs that require unique computer applications and software. Many federal computer technology applications are not, however, fundamentally different from those of the private sector and could use available commercial software packages with few, if any, changes.

- The federal bias toward custom development of more than 90% of its software has a high investment cost. Initial development of custom software is lengthy and labor-intensive and subsequent modification is difficult. Utilization of development tools and practices such as software engineering by vendors on government contracts will be emphasized.

- Transitions to more modern, efficient hardware are often inhibited by large inventories of customized software that require conversion. Automated conversion techniques and cross compilers will be needed by conversion vendors to meet price competitions. There are even cases where large modern computer hardware is set up to run like older, less-capable computers so that existing custom software can run on it.

A decade ago, the average life expectancy of a software application was three to five years. Today, five to eight years is considered average.

- Many very large systems used by the federal government are more than 20 years old. Modern software engineering practices were not employed in the development of these older systems. As a result, they are very difficult and extremely expensive to maintain, yet vital to the proper functioning of an agency.

- In some installations, the applications software investment is several times the value of the entire data processing suite.

- Some vendors will be contracted to provide appropriate transitions and maintenance of these systems. Others will provide flexible architectures for the identification and recovery of data in magnetic tape formats generated by systems and code versions no longer in use.

C

Turnkey Systems

There is continuing interest by a number of agencies in the acquisition of turnkey, packaged ADP systems where the available applications, system configuration, delivery time, and/or cost best meet the agency's needs.

Analysis of agency needs can lead to identification of system requirements that can be met nearly or completely by off-the-shelf turnkey systems.

- Vehicle maintenance, overhaul, and replacement systems created for commercial truck, taxi, and rental car fleets are directly adaptable.

- Facility and maintenance resource scheduling systems are equally adaptable.

- Many three-dimensional graphics systems and indexing systems are directly applicable to agency needs.

With relatively minor modifications, a number of commercial turnkey systems can be applied to a range of government needs.

- CAD/CAM systems are nearly universal.

- Warehousing and inventory locater systems can be readily adapted to government systems.

There are some government-unique applications that can be satisfied by either extensively modified commercial systems or systems devised for employment by several agencies.

- ADP-driven trainers for a range of vehicles and services, such as electronic system maintenance, will be required.

- Simulators related to those developed for arcades have applications in a number of both civil and defense agency training facilities.

- Digital mapping systems, an extension of engineering graphics and topology, will be acquired by a number of agencies.

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VI

Conclusions and Recommendations

VI

Conclusions and Recommendations

The need for outside contractors to support the services and software requirements of the federal government is evidenced by the increasing budget allocations and the implementation of policies that freeze federal staffing levels and move more information service support functions to the private sector.

The growing opportunities for vendors are not, however, free of business challenges. To be successful, vendors must understand the risks of contracting with the government, be prepared to support the ADP objective of the agencies, and prepare to offer ADP solutions that require multivendor bids. These recommendations, listed in Exhibit VI-1, are discussed below.

A

Know the Agency

In any situation where outside services are used after a period of in-house support, there is a tendency on the part of the user to be skeptical of the results. The skepticism may be compounded in the federal government, where a "bottom-line" business orientation has not been a way of life.

Federal government contracting offices are sensitive to these issues. They realize the need (and benefits) of using vendors but have not always been satisfied with the results nor comfortable with the vendor dependence that frequently results.

To develop a full picture of the agency, vendors, particularly those unknown to an agency, should spend considerable time marketing their capabilities to appropriate agency representatives. This must be done during the bid development process, but should also be a standard practice of intelligence gathering performed without regard to specific opportunities.

EXHIBIT VI-1

RECOMMENDATIONS

- Know the Agency
- Understand the Risks
- Develop Strategic Partners

B

Understand the Risks

As the federal government struggles to improve ADP performance in the face of many constraints, agencies will pass uncertainties and risks on to vendors. Vendors, in turn, must live with the uncertainties and develop means of containing these risks.

There are numerous factors that create uncertainty in at least the funding levels of planned and awarded programs.

- The factors with the most significant potential impact on vendors are directives and policies. The emphasis on contracting out and in particular the use of A-76, new acquisition regulations, information services policies, and trade policies all affect funding and terms and conditions of contracting.

- The availability of government personnel is the second most important risk factor. The shortage resulting from limits imposed by Congress on agency budgets and the lack of sufficient numbers of specialists and managers who support contracting-out could be reversed by strong federal employee union activities.

- Vendors also considered political uncertainty a factor. Elections and the emphasis on changing popular issues impacts ADP spending. The current focus on threats to world peace and the rising budget deficit overshadow technology issues.

- Budget changes, both increases and decreases, and budget policy are other important influences that affect the timing, priority, and near-term funding of projects.

Federal government policies also present risks for vendors.

- Changes in federal procurement/acquisition regulations and level of enforcement can impact vendors positively or negatively.
  - New FIRMRs are expected to be more competitive and to increase the number of vendors in the market at a cost (in lost market shares) to those already in the market .
  - Master Agreement Schedules (MAS) currently stress commercialization, large discounts, and almost universal maintenance support.
  - The Defense Contract Audit Agency has begun to establish burden rates for contractors regardless of previous CAS agreements.
- Deficit reduction measures will not reduce vendor investment costs that are frequently related to long, drawn-out programs that have slippery funding status and repetitive "Best and Final Offer" cycles.
- Federal government agencies employ services contracts to overcome personnel shortages. Vendors are also faced with overcoming labor pool shortages in specific hardware and software systems and/or in particular geographical areas. Failure to resolve these requirements in the pre-bid stage can be expensive in both overhead and management costs after award.
- Continuing changes in national small-business policies and initiatives have affected, and will continue to affect, the revenues of larger vendors and those classified as "small business."
  - Programs and projects earmarked as "Small Business Set Aside" or selected by SBA as an 8(a) program are denied to the slightly larger vendors as well as to the really large firms, reducing their effective market.
  - Failure to identify some fair amount of prospects for small business can have a devastating impact on new/small business organizations.
- Another source of risk is the contracting vehicle. Vendors must resign themselves to the fact that the federal government prefers to do business on a fixed-price basis. Vendors must find and put into practice methods of pricing and managing contracts that allows them to minimize the risk of performance on a fixed-price basis or they will not be able to compete successfully in the government marketplace.

C

Develop Strategic Partners

A changing technology has brought forth a new ADP environment where the focus on the function—rather than the tools—is ever increasing. Manifestations of this impact include a variety of concepts, such as:

- Supersystems that integrate several business functions as well as FGLs, DBMS, and code generators.
- Data bases that range from the personal to the corporate.
- Micro-mainframe links and other extensions to intelligent workstations.
- End-user computing, spawned by proliferating microcomputers with demands for prototyping and unique applications.
- Security, data protection, and privacy systems.

With the promise of widespread automation in mind, agencies are increasing their requirements for multidimensional systems. Few vendors are able to meet these demands by themselves. And, even fewer vendors have the R&D capability to advance their capabilities in newer technologies while spending to capture and successfully complete assignments.

The answer to these challenges lies in strategic partnering. This concept suggests that the unique requirements of a targeted agency or opportunity be used to guide the vendor's selection of products, services, and capabilities needed to satisfy these requirements. Whether the products/services are developed in-house or licensed or purchased from another vendor, the goal is to satisfy the user requirements in a manner that offers the user the appearance of the vendor as a single source of service for a wide spectrum of requirements, including post-award services such as training, documentation, maintenance, and on-going support. By envisioning linkages that make sense to the user, vendors have greater control to shape deals.

There are negatives associated with strategic partnering, however:

- Partnering cannot compensate for fundamental vendor weaknesses and, in fact, may accentuate them by creating mutual dependencies.
- Partnering in a reactive mode clouds the dynamics (positive and negative) that ensue when a company shares a vital part of its business with another, perhaps otherwise competitive, vendor. Such clouding prohibits management from engendering the intensity and drive that make partnering work.

- Partnering may be a long process that, unless started early, will result in a missed opportunity. Early partnering is critical when the window of opportunity is narrow.

- Partnering sometimes calls for teaming with competitors. These pairings not only violate business instincts but may create conflicts with other parts of the organizations if these groups assess the partnering strategy occurred as the result of their failure to deliver the product/ service required by the client agency.

D
Additional Recommendations

Vendors should vertically penetrate potential agency customers to better understand the agency mission and functions and to solve the agency problems, not modify the problem to meet an available solution.

Vendors should be aware that, especially in civil agencies, their reputation is an important factor in whether they can win work with an agency. The government is a "small" community and a questionable reputation can impede getting work in another agency. Overcoming a "poor" reference can take a long time.

It is extremely important that vendors regularly and systematically survey their agency customers to determine problems, satisfaction levels, trends, and opportunities. This survey should not be done through the field staff but by a central organization. In at least part of the survey, an independent third party should be employed to prevent biases and provide objective standards.

Vendors can make more effective use of their marketing budget if they emphasize their marketing in areas that are politically popular. Congress reacts to programs that gain or hold votes, and current budgets are more likely to emphasize domestic issues and spending programs than technology.

Vendors should manage proposal development carefully to ensure containment of the risks of unsuccessful performance.

Vendors should establish strategic partner relationships based on user requirements and should position themselves as a competent, "single-service" vendor.

FG-A

Appendix: Forecast Data Base

FG-A

Appendix: Forecast Data Base

This appendix contains the following forecast information, as shown in Exhibit FG-A-1.

- Market size by delivery mode for 1986-1992.
- Market growth rates for 1986-1987.
- Average annual growth rate (AAGR) for each delivery mode for the five-year period 1987-1992.

EXHIBIT FG-A-1

FEDERAL GOVERNMENT INDUSTRY SECTOR INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986-1992

SEGMENTATION BY DELIVERY MODE	1986 ($M)	86-87 GROWTH (Percent)	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)	87-92 AAGR (Percent)
PROCESSING/NETWORK SERVICES									
Remote Comp/Batch	323	8	350	341	357	373	391	408	3
Facilities Management	213	5	223	247	263	286	311	337	9
TOTAL	536	7	573	588	620	659	702	745	5
APPLICATIONS SOFTWARE									
Mainframe/Mini	59	19	70	83	98	124	152	183	21
Micro	15	13	17	20	22	29	35	41	19
TOTAL	74	18	87	103	120	153	187	224	21
TURNKEY SYSTEMS	342	13	388	430	473	512	555	590	9
SECTOR TOTAL	952	10	1048	1121	1213	1324	1444	1559	8
OTHER EXPENDITURE BREAKDOWN									
PROFESSIONAL SERVICES									
Software Development	953	12	1072	1216	1280	1440	1654	1837	11
Consulting	352	5	371	394	434	451	483	500	6
Education & Training	268	11	298	332	367	396	414	449	9
Systems Integration	897	10	984	1189	1400	1636	1916	2285	18
Facilities Management	734	7	788	862	930	998	1074	1180	8
TOTAL	3204	10	3513	3993	4411	4921	5541	6251	12

About INPUT

INPUT provides planning information, analysis and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning, This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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I

Issues, Trends, and Events

I

Issues, Trends, and Events

A

Introduction

INPUT analyzes the insurance industry by looking at five segments:

- Life
- Property/casualty
- Health
- Reinsurance
- Agents and brokers

Credit Insurance is included in life.

Health insurance policies are underwritten by life and property/casualty insurance companies as well as health insurance companies.

Medicare/Medicaid is included in health.

B

Life

The life insurance segment continues to feel the impact of diversification into financial areas.

- During the past decade, life insurance companies have responded to the thrust of banks' entrance into insurance activities by introducing new products with enhanced investment characteristics.
    - These new products include universal life, variable life, and universal variable or flexible-premium variable life insurance policies. Exhibit I-1 describes the different product lines of life insurance offered.
- Despite the Federal Reserve Bank's decision to reject Citicorp's attempt to acquire a South Dakota bank in order to market insurance services nationwide, and despite the failure of Congress to enact legislation permitting depository institutions to sell insurance, bank entry into insurance seems inevitable.

EXHIBIT I-1

LINES OF LIFE INSURANCE POLICIES AVAILABLE

Universal Life	Policy holder can vary the amount of insurance protection and the size and timing of premium payments.
Variable Life	The death benefit varies according to a stock fund's performance. The premium payments are fixed.
Flexible Premium Variable Life	Combines premium payment flexibility of universal life insurance with equity-based death benefit of variable life insurance.
Whole Life	Provides death benefit at insured's death. The premium payments are fixed. The policies have a cash value against which loans can be made at an interest rate specified in the policy.
Term Life	Death benefit is payable only if the insured dies within the period specfied in the policy. Premium payments are fixed.

- In addition to deregulation, legislation or proposed legislation that affects the life insurance sector includes the Gramm-Rudman tax reform act and proposed legislation that would prohibit gender-based rate setting.

The life insurance segment is dominated by direct writers. Although this segment is facing increased competition from benefits consultants for group business, full-service financial planners, and other financial institutions, some insurers are converting their direct agent networks into independent brokers who (initially) primarily handle their former companies' products.

The introduction of interest-sensitive products has developed the need to monitor investment rates in order to offer attractive and competitive products and to supply agents with information systems that will aid them in constructing policies that fulfill individual customer needs.

- Heavy emphasis has been placed on systems that support the marketing, administration, and processing of these new complex policies.
  - While many insurers have purchased software or contracted for outside processing services, CIGNA has contracted for CYBERTEK Computer Products to provide total facilities management for the sale and administration of its group universal life policies.
- Although the relationship between the direct-writer insurance company and its agents has been weakening in past years, the proliferation of new and more complex products has pushed some companies into offering financial incentives to agents for the purchase of personal computers.

Another trend in this segment is the change from a product orientation to a customer orientation. There is an interest in systems that allow single-file access to all of a customer's policies, rather than access to the customer's policy within each product-line file. Development and implementation of these customer data base systems is increasing.

While individual life insurance continues to be the principal type of life insurance protection, group life insurance is growing rapidly. Credit life insurance is also growing, although from a much smaller base.

- Group life insurance contracts are issued to employers, unions, professional associations, and other groups.
- Credit life insurance is designed to pay the balance of loans if the borrower should die before repaying the amount due.

C

Property/Casualty

The year 1987 was a spectacular one for property/casualty companies. Nine-month income figures were 24% higher than 1986, but recently prices have begun dropping again. Industry analysts expect decent profits in 1988 and softening in 1989. Price reductions in 1988 are likely to be limited because the stock market crash of October 19, 1987 reduced the industry's surplus, the reservoir of funds used to back insurance policies.

Exhibit I-2 describes the different types of property/casualty policies available.

The years 1979 through 1985 were hard years for the property/casualty segment of the insurance industry.

EXHIBIT I-1

LINES OF LIFE INSURANCE POLICIES AVAILABLE

Universal Life	Policy holder can vary the amount of insurance protection and the size and timing of premium payments.
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The years 1979 through 1985 were hard years for the property/casualty segment of the insurance industry.

EXHIBIT I-2A

PROPERTY/CASUALTY PRODUCT LINES

Personal Lines	
• Auto	Covers bodily injuries and property damages caused by insured and/or sustained by insured and passengers.
• Residential	Covers damages to the residence due to fire, windstorm, and other common perils, theft of personal property, and legal liability for bodily injury or damage to property of others.
Commercial Lines	
• Property	Covers damages due to allied lines (sprinkler leakage, flood, earthquake, business income, and extra expense), marine, crime, surityship, and other property lines.
• Liability	Covers insurance benefits that are payable to a third party to which the insured is legally responsible.
- General Liability	Includes the following two sublines:
• Contractual	Covers losses that arise from a business's assumptions of liability under a written or oral contract.
• Products or Completed Operations	Covers losses that arise from the sale, manufacturing, handling, or distribution of the insured's products.

EXHIBIT I-2B

PROPERTY/CASUALTY PRODUCT LINES

- Liability (cont.)

- Worker's Compensation	Covers work-related injury, death, and disease for employees regardless of fault.
- Professional	Includes the following three sublines:
• Malpractice	Coverage for medical professionals against loss for damages from alleged error in the performance of the insured's services.
• Errors and Omissions	Covers against losses from others resulting from failure, through error or unintentional omission, on the part of the policy holder.
• Directors' and Officers'	Protects directors and executives against financial claims arising from errors in judgement, omissions, breach of duty and wrongful acts related to their business activities.
- Umbrella	Covers against losses in excess of amounts covered by other liability insurance policies. Also protects the insured in many situations not covered by usual liability policies.

- In the late 1970s and early 1980s, premiums were dramatically lowered to compensate for excessively high premiums charged between 1974 and 1978.

- During the high interest rate years of 1980 through 1982, underwriting losses were offset by investment income.

- During 1983 and 1984, investment income declined as interest rates dropped and underwriting losses increased as insurance companies struggled to gain market share by maintaining or further lowering premiums. Large settlements awarded to claimants during the past few years have also contributed to the tight market conditions. Operating earnings after taxes for the industry as a whole were lowest in 1984 and 1985.

- During 1985 and early 1986, insurance companies either maintained premiums while increasing productivity and lowering or maintaining expenses, or increased premiums dramatically.

The effects of these hard years are widespread.

- The relationship between insurance companies and agents is changing. Insurance companies are relying more heavily on agents to write higher premium volumes in order to remain competitive. Many insurance companies are cutting back on the number of agents used, retaining the larger volume agents while cancelling agents who do not meet premium volume guidelines.

- Both direct writers and independent-agent insurance companies are pressuring their agents to automate.

    - Some companies, such as Aetna Life and Casualty and Travelers Corporation, offer financing assistance or other incentives in order to tempt agents into automating.

    - Other insurance companies have set up two-tiered commission schedules where agents who provide underwriting as well as scheduling and claims administration services receive higher commissions than agents who only provide underwriting.

    - One result of the push to automate independent agents is a trend for these agents to become more like brokers, in effect losing some of their independent status.

- Insurance companies are tightening underwriting standards and lowering liability limits partially in response to large settlements awarded to claimants in recent years and to underwriting losses in general.

  - Insurance companies need a larger number of policies at the lower liability limits in order to maintain market share.

  - Many companies are having difficulty in obtaining or affording coverage for umbrella, general-product, and/or professional directors' and officers' liability. Some companies are going without insurance while others have banded together to form captive insurers, insurance companies that are financed by their own policyholders.

  - There is great pressure upon the government from business and professionals to institute uniform standards and award limitations for commercial, professional, and product liability.

- Some insurance companies are entering new markets by acquiring companies that provide software and services to the insurance industry.

  - A few insurance companies have formed or acquired information services companies to provide software and services outside the insurance industry.

The implications of these issues to information-services vendors include the following:

- Property/casualty companies are developing new or enhancing existing claims-processing systems in efforts to reduce one of the most significant cost areas in the property/casualty segment.

- Casualty rating systems are needed to assist underwriters in analyzing risks and setting premiums while insurers are tightening underwriting standards.

- Agent support systems are of high priority to increase agent productivity and to lower costs.

D

Health

A growing economic crisis in health care will continue to be the medical industry's primary concern. The health insurance segment is under tremendous pressure from employers/customers to contain costs as premiums have increased steadily and dramatically in the past decade.

- Although rising costs of medical care are the major factor for increasing premiums, administrative and clerical errors also contribute to the increase. Hospital billing errors are commonplace, especially for hospital bills over $10,000. Errors range from billing for unperformed surgical procedures to gross overcharges for medical supplies such as sterile gloves or pills.

  - Some employers are scrutinizing their bills more carefully or hiring outside auditors to review them. Other employers have set up incentive plans for employees to catch errors on their individual bills.
  - Insurance companies are feeling the heat because employers do not believe they are aggressive enough in uncovering hospital errors or their own errors.

- Companies are concerned about the potential costs of the AIDS epidemic, which is estimated to cost insurance companies $65 billion by the year 2000.

- This segment is facing intense competition from organizations that employers/customers have turned to in order to reduce health-care benefit costs.
  - Health maintenance organizations (HMOs) provide medical care to members using physicians and facilities affiliated with the HMO for a fixed annual fee.
  - Preferred provider organizations (PPOs) allow members to receive medical care from the physicians of their choice for a fixed annual fee.

- Many of the nation's health-care professionals see Medicare and Medicaid payments as inadequate and as placing further pressure on cost control.

- Group health insurers are preparing rate increases for 1988 to meet continually rising costs. Cost containment kept medical-cost inflation to 7.5% in 1986, but 1987 saw an annual increase greater than 11%. More visits to doctors and hospitals are driving up these costs.
  - Self-insurers are usually large corporations that choose to insure themselves for all but major medical expenses.
  - Individual physicians and local or regional hospitals have banded together to form physician or hospital cooperatives in order to share overhead expenses and reduce prices to patients.

- Health insurers must offer contemporary flexible benefit plans to fulfill individual employer/customer needs and offer services such as prepayment audits in order to survive.

The implications these issues have on information vendors include the following:

- Claims-processing systems must be improved to lower costs. Cost management features need to be included in claims-processing systems including, the ability to process second- opinion claims, ambulatory surgery, and PPOs, as well as to provide prepayment audits .

- In other attempts to reduce costs and errors, claims processors are moving from batch to on-line systems.

- Health insurance marketing systems must be flexible as insurers build benefit plans to suit individual customers' needs.

The federal government is exerting strong pressure on hospitals to reduce health-care costs. The federal government has changed from a cost reimbursement payment system to a fixed-fee or prospective-payment system for its Medicaid, Medicare, and other medical-assistance programs. This one step alone has a major impact on hospitals' ability to generate revenues and cover costs.

- Hospitals and other providers to Medicaid/Medicare patients need information systems that will provide cost-based accounting and claims administration and processing.

E

Reinsurance

Reinsurance is an arrangement by which one insurer transfers all or part of its risk under a policy or group of policies to another insurer (reinsurer). The net effect is the reduction of risk to the original insurer. Reinsurance is primarily taken out for life and property/casualty insurance policies.

This segment is facing similar problems to those of the the property/ casualty segment.

- Reinsurance was underpriced in recent years, and currently insurers are not able to collect from reinsurers that have gone out of business or are in deep financial trouble. Prices did achieve a greater measure of stability in 1987.

The reinsurance capacity shortage stems from the reluctance of reinsurers to take an additional reinsurance business or, in some cases, accept reinsurance of particular risks.

In addition to the standard insurance applications, such as claims processing and financial reporting, reinsurers also need unique applications which include processing of ceded and assumed risks, contracts permitting syndication, quota share, treaty abstract, retrocession, reinstatement, and currency conversion.

II

Market Forecasts

II

Market Forecasts

A

Introduction

The insurance sector includes organizations that fall into SIC codes 63 and 64. These include carriers for life insurance; accident and health insurance; medical service plans; fire, marine, and casualty insurance; surety insurance; title insurance; and pension and health and welfare funds.

For quantitative forecasting, INPUT consolidates the insurance sector into three segments: life and health (which also includes pensions, health and welfare funds, and Medicaid/Medicare), property/casualty (which also includes surety and title insurance), and other insurance (which also includes agents and brokers).

User expenditures of industry-specific information services for the insurance sector will grow 15% annually through 1992, increasing from $2.5 billion in 1987 to $5.1 billion in 1992. Please see Exhibits II-1 through II-3.

Exhibits IN-A-1 through A-4, in Appendix IN-A, contain the detailed forecast data base for each year from 1986 to 1992 for the total insurance sector as well as for the life and health, property/casualty, and other insurance segments.

EXHIBIT II-1

INSURANCE SECTOR MARKET FORECAST COMPARISON INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987-1992

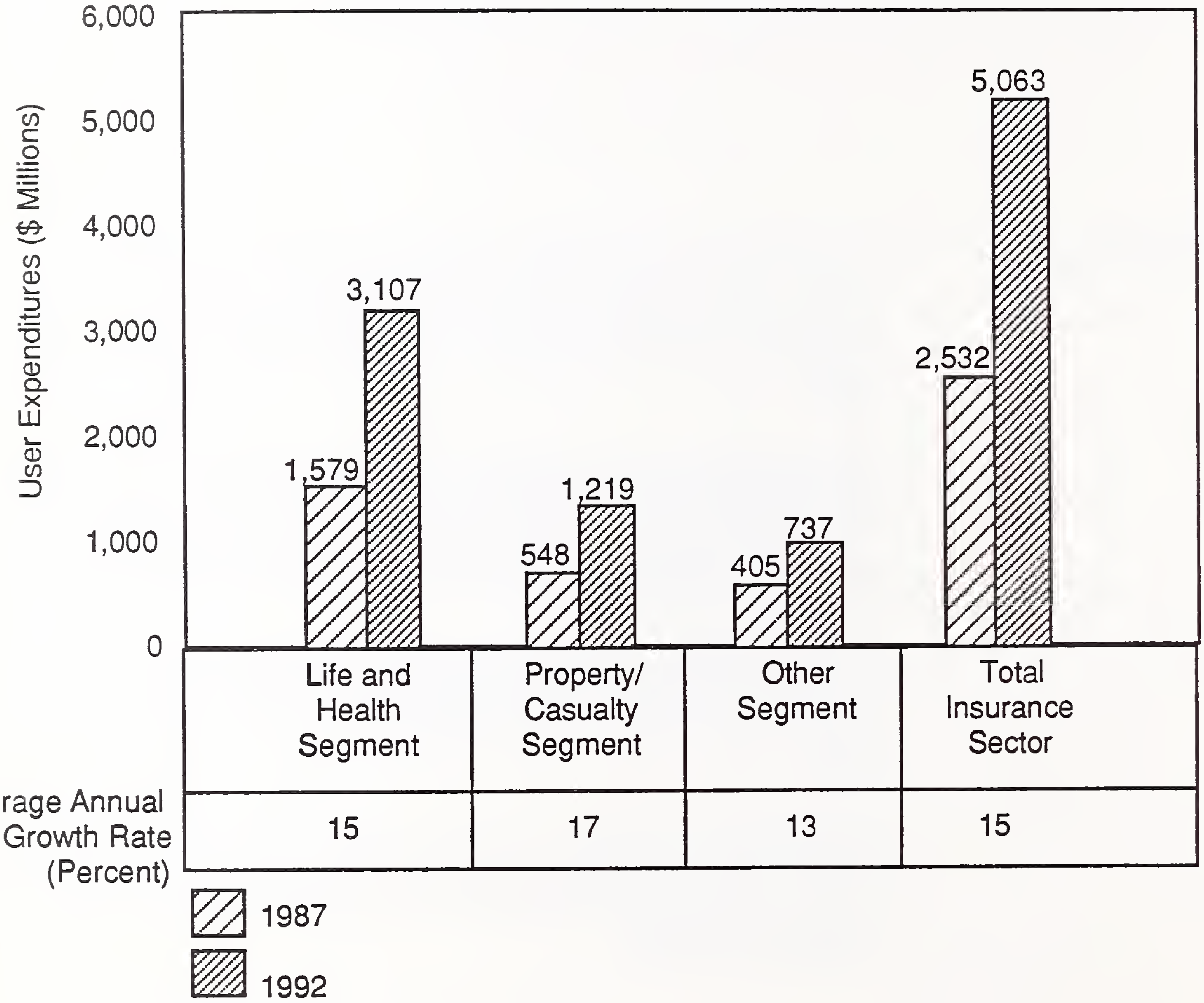


EXHIBIT II-2

INSURANCE SECTOR FORECAST—BY DELIVERY MODE INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987-1992

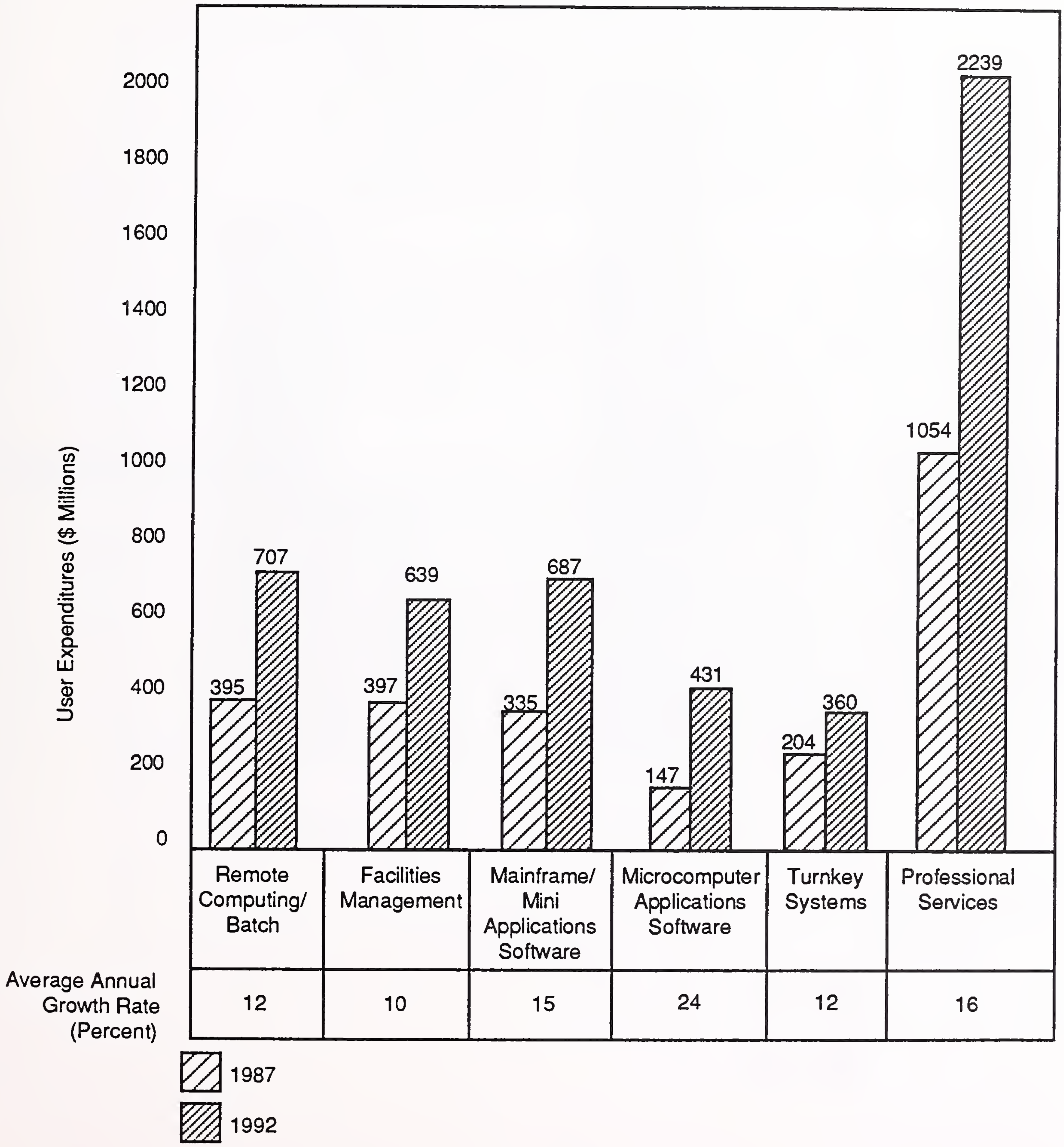
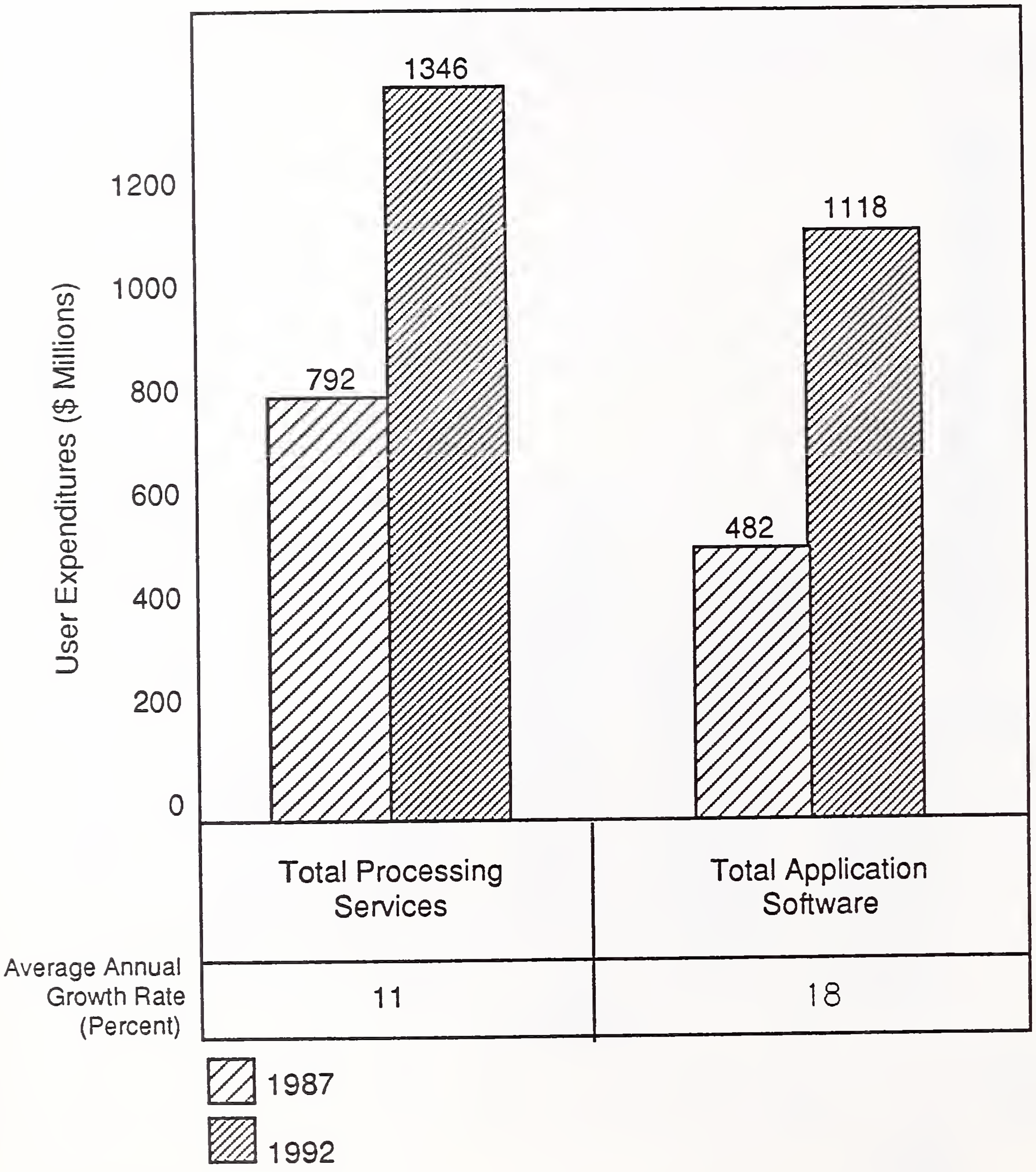


EXHIBIT II-3

INSURANCE SECTOR FORECAST—BY DELIVERY MODE INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987-1992



B

Life and Health

The life and health marketplace consists of a few major players for each segment—life, health, and Medicaid/Medicare—and a greater number of smaller vendors.

Life and health information services will grow 15% annually through 1992, increasing from $1.6 billion in 1987 to $3.1 billion in 1992. See Exhibit II-4.

- Total Medicaid/Medicare information services will exceed $440 million in 1987 and will be split between the state and local government sector and the insurance sector. Medicaid/Medicare for the insurance sector will total $340 million, with $225 million in processing-facilities management and the remaining $115 million in remote-computing services.
- Mainframe/mini and microcomputer applications software for the life and health segment are expected to grow 16% and 23%, respectively, through 1992. Turnkey systems are expected to grow at 13% annually, and processing services at 11% annually. For details, see Exhibits II-4 and IN-A-2.

C

Property/Casualty

The property/casualty marketplace is dominated by Policy Management Systems Corporation (PMSC). However, a few other vendors are gaining market share and are beginning to compete directly with PMSC.

Property/casualty information services will grow 17% annually through 1992, increasing from $548 million in 1987 to $1.2 billion in 1992, as shown in Exhibits II-5 and IN-A-3. Professional services was the largest delivery mode in 1987, and will continue to be in 1992. Microcomputer applications software is the fastest growing segment, at 28%, starting from a small base.

EXHIBIT II-4

LIFE AND HEALTH SEGMENT FORECAST INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987-1992

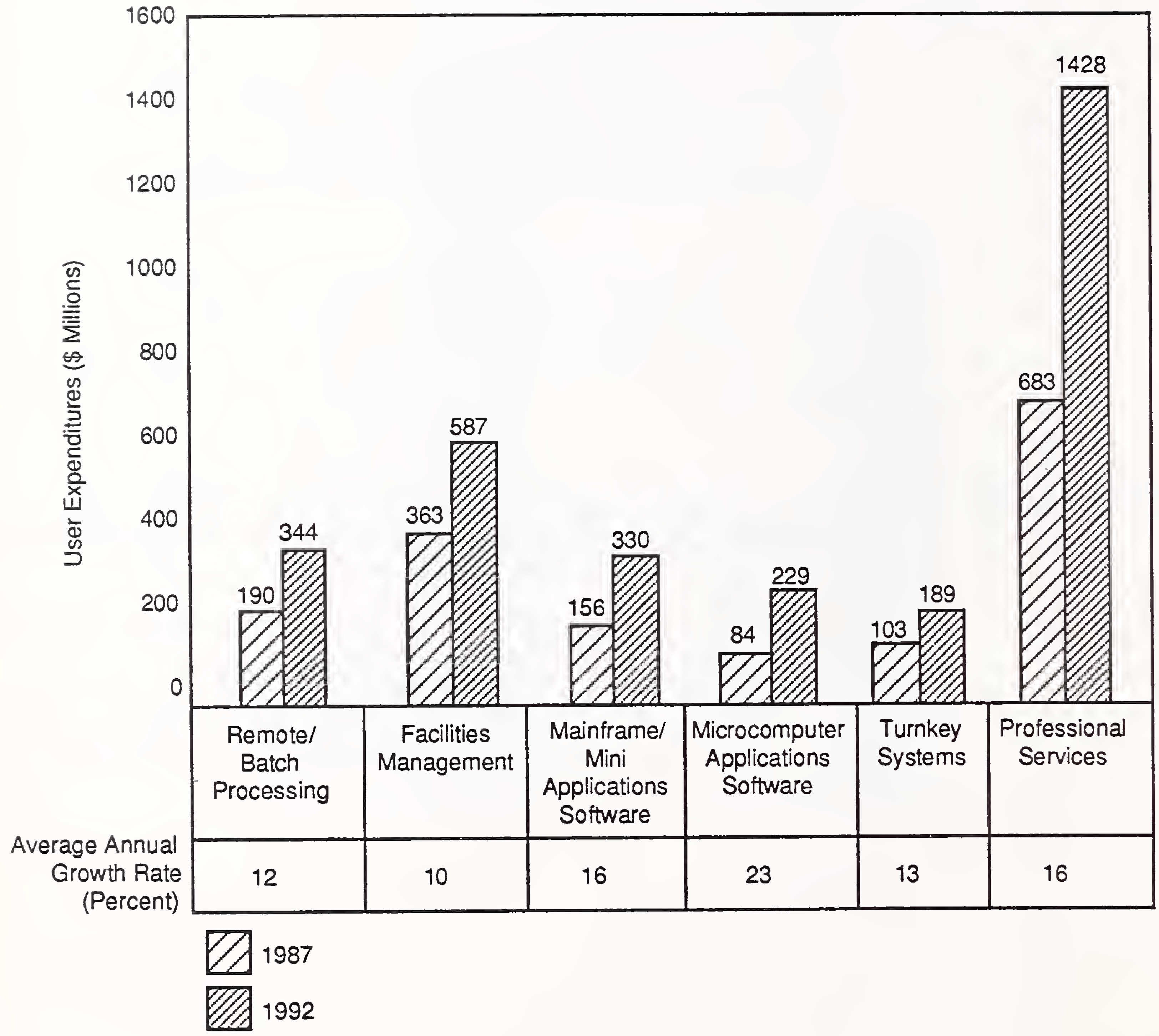
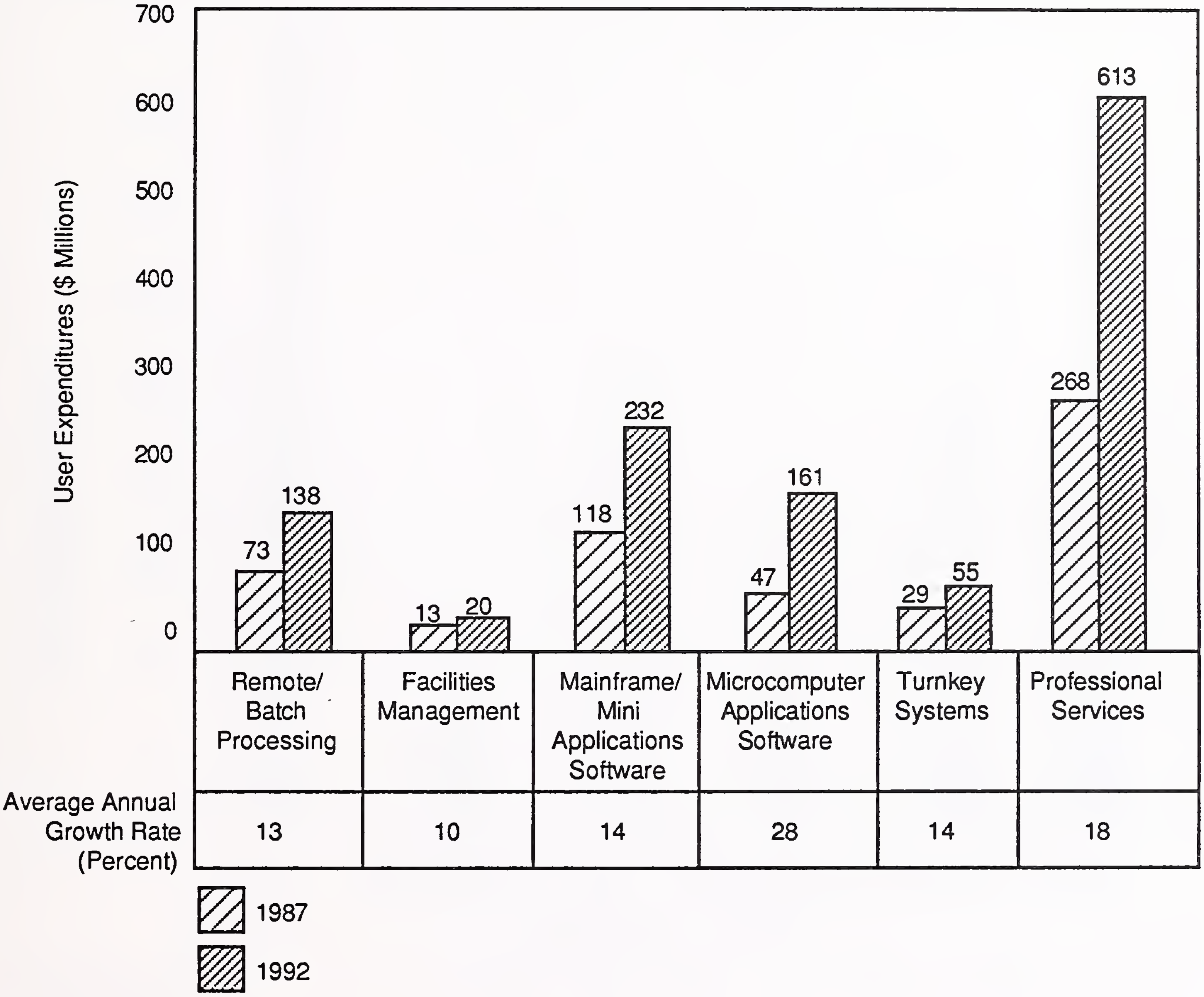


EXHIBIT II-5

PROPERTY/CASUALTY SEGMENT FORECAST INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987-1992



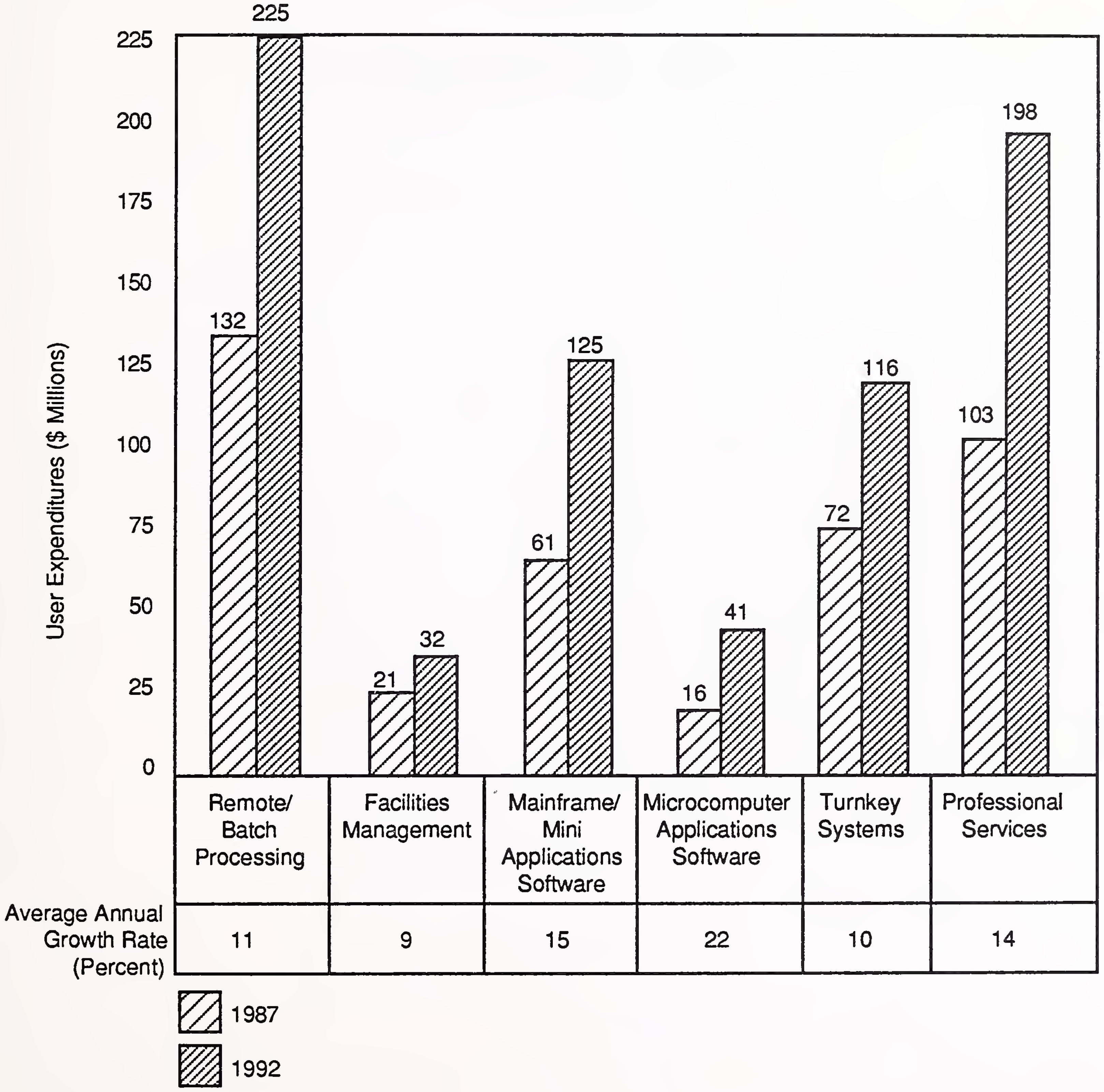
D

Other Insurance

The "Other" insurance segment will grow at 13% annually from $405 million in 1987 to $737 million in 1992, as shown in Exhibits II-6 and IN-A-4. The push for agents to automate is fueling growth in this segment, while the elimination of smaller, lower-premium, volume agents is offsetting the growth. Remote/batch processing was the largest delivery mode in 1987 but will be supplanted by professional services in 1992.

EXHIBIT II-6

OTHER INSURANCE SEGMENT FORECAST INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987-1992



III

Competitive Developments

III

Competitive Developments

A

Introduction

The insurance information-services market is characterized by:

- The presence of large, well-established vendors.
- The growing number of information-services vendors owned by an insurance carrier or group of insurance carriers.

The market shares of selected leading vendors in the insurance sector are shown in Exhibit III-1.

Leaders in the life insurance market include The Continuum Company, CYBERTEK Computer Products, PALLM, and Information Systems of America.

Leaders in the health insurance marketplace include Electronic Data Systems (EDS), Advanced System Applications, Erisco, Dyer, Wells and Associates, and McDonnell Douglas Information Systems Group.

Medicaid/Medicare leaders are The Continuum Company, System Development Corporation, EDS, Computer Sciences Corporation, and McDonnell Douglas Information Systems Group.

Leaders in the property/casualty market include Policy Management Systems, PALLM, and Equifax.

Agency systems market leaders are Redshaw, ISI Systems, ARC/AMS, Agena, and Insurenet.

EXHIBIT III-1

VENDOR SHARES OF INSURANCE SECTOR INDUSTRY-SPECIFIC INFORMATION SERVICES, 1987

($ Millions)

Vendor Name	Segments Served**	Delivery Mode				Total Revenue ($M)	Percent Share of Total Insurance IS Sector
		Processing Services	Applications Software	Turnkey Systems	Professional Services		
1. Electronic Data Systems (EDS)	H,L,PC	300	70		50	420*	16.6
2. Policy Management Systems (PMSC)	H,L,PC	78	67	20	30	195	7.7
3. Equifax	PC,A	120		10		130*	5.1
4. Advanced Systems Applications (ASA)	H	7	47			54*	2.1
5. McDonnell Douglas Information Systems	H	25		5		30*	1.2
6. ARC/AMS	A	20		30		50*	2.0
7. The Continuum Company	H,L	6	17		35	58*	2.3
8. Redshaw	A			40		40	1.6
9. ISI Systems	PC,A	19	13			32*	1.3
10. Agena Corporation	A	13		14		27	1.1
11. Insurenet	A			27		27	1.1
12. CYBERTEK	L	10	14			24*	1.0
13. PALLM	H,L,PC	12	12			24*	1.0
14. Information Systems of America (ISA)	H,L,PC,A	20				20*	.8
15. Vantage Corporation	L		7	6	5	18*	.7
16. Delphi Information Systems	A		11			11*	.4
17. General Data Systems	PC		10		2	12*	.5
18. Financial Data Planning	L,A	7	4			11*	.4
19. Dyer Wells	H		11			11*	.4
20. Applied Systems	A		11			11*	.4
Subtotal, leading Vendors:		637 (80%)	294 (61%)	152 (74%)	122 (12%)	1205 (48%)	
All other Vendors:		155 20%	188 (39%)	52 26%	932 (88%)	1327 52%	
Total Insurance Market:		792	482	204	1054		

* INPUT estimate

** H = Health L = Life PC = Property, Casualty A = Agency

B

Vendor Profiles

1. ARC/AMS (1 Heritage Drive, North Quincy, MA 02171)

a. Products/Services

ARC/AMS provides IBM Series I–based minicomputer and IBM PC–based microcomputer turnkey systems and batch and remote-batch processing services to insurance agents and holders.

- Available software modules for turnkey systems are:
  - ARC/AMS Series I: Accounting, billing, daily retrieval, claims, client services, diary, insured reporting, system control, letterwriter, query, and marketing (prospecting and sales analysis).
  - The Pathfinder (Formerly AMS Micro) offers: Accounting, billing, claims, marketing (profiling and query), daily retrieval (forms and interface), and diary. Pathfinder can be used as a standalone PC/AT system or as a terminal to the ARC/AMS Series I system.
  - Scout, introduced in 1987, offers many of the same functions as Pathfinder, plus multiterminal support, office automation functions, and an upgrade to Pathfinder for $4,995.
- "The Batch Service" provides batch and remote-batch processing. Available applications include the 24 accounting/management reports, Agent-Rite Claims, payroll, accounting, consolidation package, central management reporting, and surplus lines tax program.
- Pioneer is a repackaging of "Batch Service" on a PC. There are over 300 Pioneer systems installed.

b. Markets Served

ARC/AMS provides products and services to independent agents/brokers within the insurance industry sector, with over 10,000 U.S. customers.

c. Company Strategy

ARC/AMS is an industry innovator in agency/company interface development.

d. Recent Activities

ARC/AMS and Compare Data Corporation entered into a joint development and marketing agreement that will provide for the sharing of a common policy data base by joining comparative rating software and agency automation.

In 1986 ARC/AMS acquired Savage Computers, which provides rating software. Also in 1986, ARC/AMS acquired the customer base of Computerized Insurance Accounting of Oklahoma City, a batch-processing service company.

An on-line information network (A1 I-NET) was introduced in 1987 by ARC subsidiary ANS for motor vehicle reports, stock quotes, and credit reports.

AMS and McCracken Computer launched a cooperative effort to incorporate ACORD standards for agency/company interface into their respective systems.

2. Advanced System Applications, Inc. (1 ASA Plaza, Bloomington, IL 60108)

a. Products/Services

Advanced System Applications, Inc. (ASA) provides on-line applications software and data-processing services for the health insurance industry.

ASA's IBM mainframe software products include the following:

- Claims Administration and Payment System (CAPS) covers basic, major medical, comprehensive, disability, dental, and vision health insurance plans.

- Claims Administration System (CASII) processes medical, dental, and vision claims. This product was acquired in 1985 from System Development Corporation.

- CAPSule is a health claims reporting system, interfacing with CAPS, but also useable on a standalone basis.

- Advanced DentaLogic Subsystem (DLS) automates the methodology of American Dental Examiner, Inc.'s *Dental Claim Manual.*

- ACESS converts data to the CAPS standard and creates a new eligibility file for updating records.

- ADMIN is a group billing and administration system.

Remote processing applications available include CAPS, ACESS, and selected CAPSule reports.

b. Markets Served

ASA targets the health insurance industry sector and large companies that administer in-house insurance plans.

c. Company Strategy

The company will continue to concentrate on the health insurance segment. The company expects its rapid growth to continue from sale of its software products, which address productivity measurement and cost-containment concerns.

3. The Continuum Company (3429 Executive Center Drive, Austin, TX 78731)

a. Products/Services

The Continuum Company (TCC) provides software products and processing and professional services to health and life insurance companies. TCC offers the following software products:

- TCC's primary revenue generator is the Client/Contract Administration (CCA) System used for designing, selling, and servicing insurance and financial services products. CCA consists of four modules, which are fully integrated:

  - Client Management System, which TCC emphasizes as an industry CIF technology leader

  - Product Management System

  - Contract Management System

  - Distribution Management System

TCC has invested more than $40 million in completing this key product line.

- TCC's UFE/70 (Continuum) Systems consist of software for policy management. Available system components include:

  - Home office administration systems
  - Support systems
  - Optional systems

- Life-COMM III, acquired from Informatics General in 1984, is an integrated administrative system that supports new business, policy, agency, and actuarial administration; corporate accounting; and field force requirements.

- Microcomputer software products include:

  - Continuum Life Agency Support System (CLASS)
  - Sigma for agency management
  - Ratebook Entry System for the development/rating of policies to be entered with TCC's Policy Administration Systems

- Professional services include:

  - Custom programming
  - Systems design
  - Project management

One hundred and ninety clients utilize Continuum or Lifecomm products; they belong to a user consortium to share development costs and enhancement planning.

TCC's mainframe software in available to clients as a remote computing service.

b. Markets Served

TCC provides products and services to the life, health, and annuity insurance markets.

c. Company Strategy

TCC will continue to use advanced technology development to maintain its leadership position in the life insurance industry.

d. Recent Activities

The growth of TCC is keyed to the success of CCA. During 1986-1987, clients deferred purchases of CCA, awaiting its completion. Version 1.0 is now being delivered to 104 insurance companies who have contracted for it.

TCC has entered a VAR agreement with Syntellect to provide "Infobotics", an AI-based voice response system to answer calls from clients and agents.

4. CYBERTEK Computer Products, Inc. (6133 Bristol Parkway, Culver City, CA 90230)

a. Products/Services

CYBERTEK offers processing services, software products, and professional services for life insurance companies.

CYBERTEK's new CK4 architecture and family of products incorporates IBM's SAA as an integral part of this architecture.

CYBERTEK's primary applications software is CYPROS/AP, an integrated marketing, administration, and communication system.

- Subsystems include new business, in-force policies, agent's systems, and administrative support systems.
- Micro Information Manager (MIM) is available as part of CYPROS/AP or as a separate product. MIM permits the networking of IBM PCs for office automation and life insurance functions. MIM/NET is a local area network product.

SalesPro is a standalone integrated proposal software package that operates on IBM PCs.

Processing services consist of facilities-management services and remote-computing services.

- Applications available to processing clients include CYPROS/AP and MIM.

Professional services available to CYBERTEK software clients include project planning, system installation and modification, customer training, and technical consulting.

b. Markets Served

CYBERTEK provides products and services to the life insurance industry sector only.

c. Company Strategy

CYBERTEK will continue its emphasis on programs for support and professional services to be extended over the lifetime of software licenses.

CYBERTEK has a customer base of over 100 life insurance companies; three affiliates of the Kemper Group account for roughly 30% of total revenues.

d. Recent Activities

CYBERTEK entered into a long-term agreement to provide total data processing services for Connecticut General Life Insurance Company's (CIGNA) Group Universal Life Insurance Marketing Program.

CYBERTEK completed development of I-System, a new software system that provides processing for a range of advanced and traditional life insurance products and related financial services. Initial deliveries of I-System are now being made to 13 clients.

e. Future Directions

The company will continue to develop new software and services to meet demands as life insurance and financial services companies introduce more sophisticated policies, products, and services.

CYBERTEK has established a Workstation Systems Division to identify new markets for the workstation product line.

5. Equifax, Inc. (1600 Peachtree Street N.W., Atlanta, GA 30309)

a. Products/Services

Equifax provides processing services and software products. Equifax's products and services to the insurance industry include the following:

- CLUE is a new data base that allows property/casualty companies to share loss information, and thus more accurately rate policies and identify fraud. The company is expanding this service to 30 states.
- The company offers IBM-compatible software products that may be purchased or used as a processing service. Modules available include:
  - Automated Underwriting System
  - Micro Rating System
  - Policy Information and Management System
  - Distributed Communications System
  - Company Communications System
  - Data Rearrange System
  - Universal Billing
  - Agency Bill
  - Universal Distributor System
  - Premium Accounting and Claims Administration
  - Worker's Compensation Unit Statistical Reporting System
  - Universal Commercial System

  - Universal Personal System
  - Information Gateway System

- The Dataflo division of Equifax provides for motor vehicle record information to automobile companies. The three modes of delivery are remote/remote-batch, and batch processing. The bulk of Equifax's revenues from insurance companies come from this service, which is priced on a per-transaction basis.

Other products and services not related to the insurance industry sector include customer credit reporting and processing and software products for the utilities industry.

b. Markets Served

Equifax provides products and services to the life/health and property/casualty insurance industry sectors, as well as the banking/finance, retail, and utilities industries.

c. Recent Activities

C.B. Rogers, former IBM senior vice president, became president and chief operating officer of Equifax as of October 1, 1987.

d. Future Strategies

Equifax will emphasize the scope of its delivery of insurance data loss information via electronic means. Claims histories for commercial vehicles could be next.

6. ISI Systems, Inc. (161 Forbes Road, Braintree, MA 02184)

a. Products/Services

ISI Systems provides processing services and application software products.

Processing applications available include the following:

- Mass-Auto for Massachusetts auto insurance companies
- ARTS (Assigned Risk Teleprocessing System)
- ICAPS—similar to ARTS but for commercial auto business
- Administrative Billing System
- Pol*Star—policy storage and retrieval system
- Analyzer—expert system for risk analysis

Software packages available include the following:

- ACC-U-RATE is an Apple microcomputer system for rate/quote for package and monoline policies, as well as private passenger and homeowner policies.
- Insurance Writer, a more comprehensive rate/quote package, is replacing ACC-U-RATE.
- Ratabase is a premium calculation and statistical package for use with insurance policy writing systems. It runs on a mainframe or on IBM PC/XT or AT microcomputers. During 1988, ISI plans to introduce an on-line CICS version of Ratabase to expand their market.

b. Markets Served

ISI provides products and services to the property/casualty insurance sector only.

c. Company Strategy

ISI will continue to concentrate solely on the property/casualty sector and expects to continue the considerable growth in revenues it has enjoyed in past years. ISI volumes increased by 28% during fiscal 1987 to $31.7 million. ISI projections call for $100 million revenue levels by 1991.

d. Recent Activities

In June 1986, ISI Systems became a private, independent company. From 1976 through May 1986, ISI was a subsidiary of Grumman Corporation. Currently, the company is primarily owned by its president, Charles C. Johnston, and other ISI employees.

ISI introduced The Distributor, a software product used by insurers to send software updates from their mainframes to personal computers in agent and branch offices.

The Forms Processing System is a P/C-based new product for designing and producing policy documents.

7. Information Systems of America, Inc. (500 Northridge Road, Atlanta, GA 30338)

a. Products/Services

Information Systems of America, Inc. (ISA) markets and supports financial and investment management applications-software products. ISA also provides product-enhancement and consulting services to its clients.

ISA provides the following IBM mainframe and compatible software products:

- ISA Accounting, Budget, and Cost Systems is a financial management and reporting system.
- ISA Cash Disbursements System centralizes and controls the entire disbursements process.
- ISA EXTRACTO is a file management reporting system.
- TELEXTRACTO is a report generator.
- PRISM is a portfolio reporting and investment-securities management system.
- OSCARS, PRISM's predecessor, is an on-line securities control, analysis, and reporting system.
- Foretax provides tax planning and compliance.
- TAX DIRECTOR is a microcomputer version of FORETAX.

b. Markets Served

ISA provides services to the insurance, banking and finance, state government, and other sectors.

c. Company Strategy

ISA continues business expansion into the U.K. through UIS, Limited, a sister subsidiary.

8. Packaged Automated Life/Liability Management, Inc. (2606 Fortune Circle, East Drive, Indianapolis, IN 46241)

a. Products/Services

PALLM provides applications-software products and professional-services consulting.

PALLM offers the following software products for home office management:

- PALLM-VECTOR is for life/health insurance companies. Available modules include the following:
    - New Business/Policy Issue
    - Policyholder Service
    - Premium Billing
    - Premium Processing
    - Accounting and General Ledger
    - Marketing and Agency/Commissions
    - Marketing and Agency Performance
    - Agent Licensing
    - Universal Life I
    - Variable Universal Life II
    - Client Management
    - Actuarial Reporting
    - Annuity Administration
    - Teleprocessing Executive
- PallmPAC is for property and casualty insurance companies. Available modules include the following:
    - Reinsurance Billing and Payables
    - Automobile Rating
    - Homeowner's Rating
    - Policy Administration
    - Claims Administration
    - Billing and Collections
    - Accounting and General Ledger
    - Disbursements/Check and Draft Reconciliation
    - Quote Management
    - Bureau Reporting
    - Alpha Inquiry/Client Access
    - Investment Accounting
    - Automated Depreciation

Professional services consulting to assist in customization of its software packages to meet specific client requirements is also provided.

PALLM's POISE product aids financial and actuarial officers in devising and evaluating investment strategies and managing risks.

b. Markets Served

PALLM serves the life/health and property/casualty segments of the insurance industry.

c. Company Strategy

PALLM plans to increase its presence in the property and casualty insurance segment and directly compete with Policy Management Systems, the acknowledged industry leader.

d. Recent Activities

In August 1986, PALLM announced PALLM V-TASC (VECTOR Turnkey Administrative Software and Computers), a minicomputer turnkey system for smaller life and health insurers.

e. Future Directions

PALLM will continue to modify and develop products to serve the life and health segment while continuing its push into the property and casualty segment.

9. Policy Management Systems Corporation (P.O. Box 10, Columbia, SC 29202)

a. Products/Services

Policy Management Systems Corporation (PMSC) provides processing services, software products, professional services, and turnkey systems.

PMSC's primary IBM or compatible mainframe software packages are:

- Policy Management System, the company's primary product
- Insurance Management Information System
- Account Reconciliation System
- Financial Management System
- Securities Management System

IWS-Premium Handling System and IWS-Claims Handling System are microcomputer software products marketed under the trade name Insurance Work Station.

A microcomputer tool, Agency Work Station (also known as the Bundle), automates commercial and personal rating for multiple states and multiple companies and is geared to independent agents.

Processing services include facilities-management and remote-computing services.

- Available remote-computing applications include automobile policy, property/casualty, assigned risk, and claims estimating.

- PMSC's data base service offers Insurance Information Bank.

The Basic Processing System is a turnkey system based on IBM 4300-series computers and is targeted to small- to medium-sized insurance companies, brokers, and agents.

Professional services provided to PMSC clients include project-planning services, implementation and migration services, education services, and consulting services.

PMSC has introduced an expert health claim-handling system, ExClaim.

b. Markets Served

PMSC provides products and services to the property and casualty insurance industry sector.

c. Company Strategy

The company continues to invest a large portion of total revenues ($29 million in 1986) on research-and-development activities and to acquire products and/or companies whenever acquisition is more cost-effective than internal development.

PMSC has become an IBM IMAP, extending its ties to the IBM sales force.

Arthur Andersen has the rights to market PALLM's products outside the U.S.

d. Recent Activities

PMSC is teaming up with ADP, tapping ADP's extensive data base of collision records from claims adjusters and identifying problem drivers. The resulting data base is competitive to Equifax's CLUES. The system will be updated frequently (perhaps daily) to provide current information.

PMSC has begun utilizing IBM's DB2 on its IMIS products to improve system flexibility.

e. Future Directions

PMSC plans to continue its expansion into the group insurance market and its diversification into foreign markets.

PMSC is investing heavily ($100 million) into future development of its Series III systems, incorporating IBM's SAA as a standard.

10. Redshaw, Inc. (103 Yost Boulevard., Pittsburgh, PA 15221), a subsidiary of Hartford Insurance

a. Products/Services

Redshaw provides turnkey systems, associated support services, and hardware/software upgrades to existing systems.

Redshaw's turnkey systems are based on its Comprehensive Insurance System, a total agency-management information system that integrates file-retrieval, accounting, and word-processing functions. The turnkey systems' Wang hardware configurations, telecommunications/networking capabilities, and reporting capabilities vary by model.

The target markets of turnkey systems offered include the following:

- Comprehensive Insurance System is targeted to insurance agencies and companies with annual premium volumes of $500,000 to $10 million, processing up to 50,000 policies a year. This has been Redshaw's primary source of revenues.
- Series/2 is targeted to property and casualty insurance agencies and brokers with annual premium volumes over $10 million.
- MicroPlus is targeted to agencies with $500,000 to $3 million in annual premium volume, at a price 25% below other Redshaw products.
- Redshaw Advantage is targeted to agencies with $2 million to $10 million in annual premium volume.

b. Markets Served

Redshaw provides products and services to independent property and casualty insurance agents and insurance brokerage firms. The majority of customers have annual premium volumes of $1 million to $20 million.

c. Recent Activities

Redshaw has announced a multicompany interface for its users, allowing agencies to connect their Redshaw systems with more than a single insurance company. Of the 733 Redshaw users in the U.S., the majority connects with two to five companies.

In August 1986, Redshaw introduced Suplerlink, a line of advanced terminal emulators that enable agents to run Wang PCs and IBM PC/XTs as integrated Redshaw System workstations.

11. Electronic Data Systems (EDS) (Insurance Division, 7171 Forest Lane, Dallas, TX 75230)

a. Products/Services

Facilities management, systems integration, professional services, and interactive processing are offered.

EDS's newest product, the Insurance Machine, administers life, health, and annuity product lines.

b. Markets Served

EDS serves health insurance providers, including Blue Cross/Blue Shield and Medicaid on a very large scale.

EDS operates General Motors' automated insurance and claims programs leveraging its position as a GM subsidiary.

EDS's Insurance Machine systems are targeted to large firms in the life and property/casualty sectors. Long-term contracts for facilities management with leading firms such as Allstate, Aetna, and Transamerica reflect EDS's approach to this market.

c. Recent Activities

EDS has successfully consolidated 90% of the GM health-care program.

EDS has solidified a relationship with the NASCO consortium, providing for long-term processing contracts with five of the largest Blue Cross/Blue Shield firms in the U.S.

EDS has closed a number of other very significant large orders in 1987, bringing its revenues from the insurance sector to over $400 million. This makes EDS the industry leader by a wide margin (refer to Exhibit III-1).

d. Future Strategies

EDS will continue to position itself as a uniquely experienced technology company, able to execute very large and complex data processing operations in a more effective manner than any of its competitors.

12. Other Vendor Activity

The McDonnell Douglas Information Systems Group (MDISG) offers plan administration, claims administration and reporting/analysis for health claims operations. The Physician Systems Company serves medical clinics, HMO's, medical schools, and physicians. This vertical market produces about $30 million in annual revenues, ranking MDISG in the top ten vendors of insurance IS revenues.

Vantage Computer System provides life and annuity products.

Incepts, Inc. offers home office administration software and services for life insurance companies. Batch processing accounts for 75% of Incepts' revenues.

IV

Information Systems Department

IV

Information Systems Department

A

Major Issues

1. Driving Forces

The life insurance segment of the insurance industry is enjoying significant growth. Major contributing factors include:

- Tax legislation permitting insurance companies to include life insurance-based investment vehicles in their product line.
- The variable annuity and universal life products that allow the client to make investment decisions. Insurance companies are using this feature to initiate the transfer of a major portion of risk into the client's hands. Business is increased and risk to insurance companies is reduced.

This segment continues to face:

- The shift from a product to a customer focus
- The requirement for competitive agent support systems for proposal preparation, administration, client information, and tracking.

The health segment of the insurance industry continues to be pressured by employers/customers to cut costs. It also faces increasing competition from the health maintenance organizations (HMOs). In some cases, health insurers are implementing HMOs themselves.

Additionally, new trends are causing significant change in the industry including:

- Flexible benefit programs. No longer do employers buy packages and provide them for all employees. Today, more and more employers are providing a menu of benefits for their employees to choose from due to changing social and economic conditions; thus, the health industry must sell to the individual as well as the corporation. These changes are causing a substantial investment in information systems and procedures to support the entire product life cycle.

- Medicare mandating fixed prices for outpatient care. Hospitals can no longer routinely bundle overhead into these charges. This is causing a review of processes and procedures for both hospitals and insurance companies.

- Many health-care providers are moving from an acute-care orientation to a trauma, surgical, or accident center basis. The individual practice has completely given way to group practices and various forms of affiliated practices.

The property/casualty segment of the insurance industry continues to experience problems due to pricing policies of the last decade, interest rate fluctuations, and large settlements awarded to claimants. This segment also faces:

- Increased competition, including captive and self-insurers

- Elimination of and/or significant changes in the agent relationships

- Setting of liability limits

- Cost reduction through automation of paperwork, consolidation of backbone systems, and replacement of older technologies and fragmented systems that do not meet functional or capacity needs

- Extreme public-relations problems due to increased premiums and refusals to insure

Exhibit IV-1 summarizes the driving forces in the insurance industry sector.

2. Information Systems Issues and Objectives

Decreased profitability is the central issue for insurance firms due to a number of factors, including:

- High administrative costs due to paperwork and/or very old systems
- Large underwriting losses
- Severe price competition
- Tax reform
- Interest-sensitive investments and continued lower interest rates

EXHIBIT IV-1

INSURANCE DRIVING FORCES

- Productivity and Cost Reduction
- Tax Reform
- Risk, Profitability, and Business Management
- Flexible Benefit Programs
- Government Regulation of Costs

- Agent demand for on-line support systems
- Nonprofitable insurance products that were based on technology rather than an ROI analysis

With the changing and very complex insurance products, the newer technologies, and the information systems (IS) function at the core of the daily execution of business, management is requiring new tools and procedures to effectively manage an accelerating rate of change and ensure that the IS dollar is allocated and used most profitably to meet the corporate objectives. To this end there is a focus on providing IS tools for:

- Product and business planning
- Risk analysis and management
- Minimizing the amount of administrative information stored and reducing administrative processes
- Financial analysis
- End-user access to client and product information
- Single data bases (distributed eventually)
- PCs and/or other access/computational devices targeted for or in most end-users' hands

EXHIBIT IV-2

INSURANCE IS ISSUES

- Productivity Nonprofitability
- Competitive Agent Support
- Financial Risk on Investments
- Market Share
- Management Effectiveness
- Administrative Paperwork Bottlenecks

In the life sector, the 1986 tax reform has resulted in the investment insurance vehicle. Concurrently, the ability for a purchaser of insurance to personally direct the investment of his funds is both a draw for new business and a major profit risk reducer for the insurance companies. This has resulted in major IS support work.

In the life and health sectors, flexible benefit plans are changing the ways insurance is provided through employers. As individuals select custom benefit programs, both the sales and administrative processes must be revamped, including the related IS systems.

IS staffing remains a major issue with retention of key personnel a serious concern. Several of the executives surveyed cited that candidates feel the insurance business just is not interesting to most computer professionals. Industry and technology changes cited above may reverse this trend in the next few years.

Exhibits IV-2 and IV-3 summarize the key issues and objectives as identified by the respondents.

3. Impact of New Technology

Technologies that allow insurance companies to connect end-user terminals to central sites are key to current and future success. This area of computing is already fully integrated in a few very successful corpora-

EXHIBIT IV-3

INSURANCE IS OBJECTIVES

- Provide Business Management of IS
- Develop Risk Reducing Products
- Expand Market and Client Base
- Improve Operational Efficiency and Customer Support

tions using available technology and strict controls. All respondents agreed, however, that serious technology problems will remain, such as:

- Lack of capability to easily integrate mixed vendors into LANs.

- Problems of providing and controlling software release levels from the central site. Sending thousands of floppies without control of installation and use is confusing at best. Further, as larger regional centers are set up, there is no satisfactory technology available to download the many megabytes of operating systems, applications, and data in a timely, controlled, and cost-effective manner.

- Unattended operation of office or regional installations remains a user objective but not a technical reality.

Distributed (or apparently distributed) data bases are not yet viable on a large operational scale. End-user data access is becoming increasingly critical for all sectors of the insurance industry.

Artificial intelligence and its applications were mentioned by all respondents. Recent developments from the artificial intelligence (AI) community are very interesting, but these solutions will not be available in the operational or tactical timeframes desired by most respondents. Applications of major interest include:

- Risk and asset management

- Support for the field agent in customizing a policy to meet specific financial and subjective objectives of the client

- Medical review analysis as well as diagnostic services

A strong requirement was voiced by more than half the respondents for volume image processing of typed and, especially, handwritten documents. This remains a strategic technology but is not expected to be practically applicable in the near term.

Reduction of paperwork remains a major issue. One medium-sized firm stated it prints two miles of paper every hour; another prints 100 pages per partner per day. This has to be brought under control from management, resource, and business perspectives.

Information technology to assist the IS and corporate executives in business, product, asset, risk, and profit planning and management is available in bits and pieces but is still in the formative stages of development. Furthermore, due to the increased variety and complexity of financial instruments, fluctuating interest rates, and economic factors, there is an accelerating demand for sophisticated IS technology to manage portfolios and profitability.

Exhibit IV-4 summarizes the areas of new technology that are of high interest to the insurance industry.

EXHIBIT IV-4

INSURANCE NEW TECHNOLOGY AREAS OF INTEREST

- Data Bases—Distributed and/or Relational
- Networks—Integrated Mixed Vendor
- Artificial Intelligence—Risk Analysis
- Image Processing—Machine and Handwritten
- IS Integrated Business Management Tools
- Unattended Operation

B

New Applications

Major applications development continues in agent support systems for proposal work, flexible benefit sales, client tracking, and administration.

Procedures and systems applications are being developed to provide distribution and release-level control of software that is downloaded to regional, end-user, and agent sites. Site support will include from 10,000 to 15,000 locations.

Some relational and distributed data bases are in place, albeit mostly in pilot mode. Every account we talked with does not believe the management, technology, and control problems are satisfactorily solved. Continued development activity in the face of inadequate technical solutions testifies to the importance of these applications to the insurance industry.

New systems are being developed to support new insurance products that allow the purchaser to manage his investment.

AI programs and expert systems are in the initial stages of development for application in a number of areas, including:

- Financial investment management
- Premium calculations
- Loss limits
- Medical review
- New product ventures and business ROI planning

Single premium products are being developed.

There is continued development of new and completely reworked administration and claims systems for all segments of the industry. Old systems often cannot support capacity demands, nor do they provide the services and functions required in today's insurance world. These system replacements are unavoidable, essential to meeting the IS needs of the end users, and a current activity cited by all respondents.

Exhibit IV-5 summarizes major new applications as identified by the respondents. Exhibit IV-6 summarizes sources of new application products, and Exhibit IV-7 summarizes assignment of development staff.

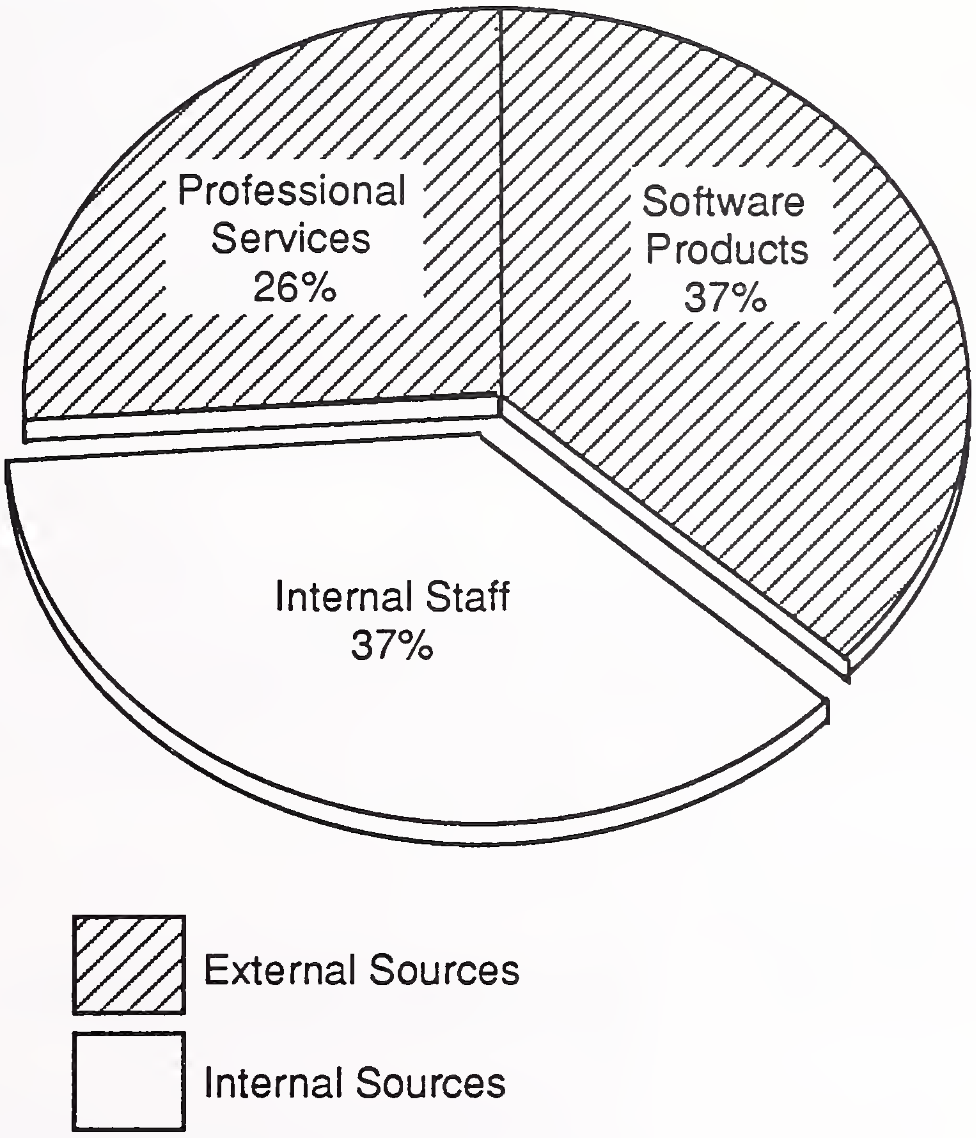
EXHIBIT IV-5

INSURANCE NEW APPLICATIONS

- End-User Administration and Data Access
- Software Distribution and Release Control
- Risk-Reducing and Business-Management Tools
- Tools for Customer Investment Management
- Policy Administration and Claims Processing
- Distributed Data Bases with Central Control

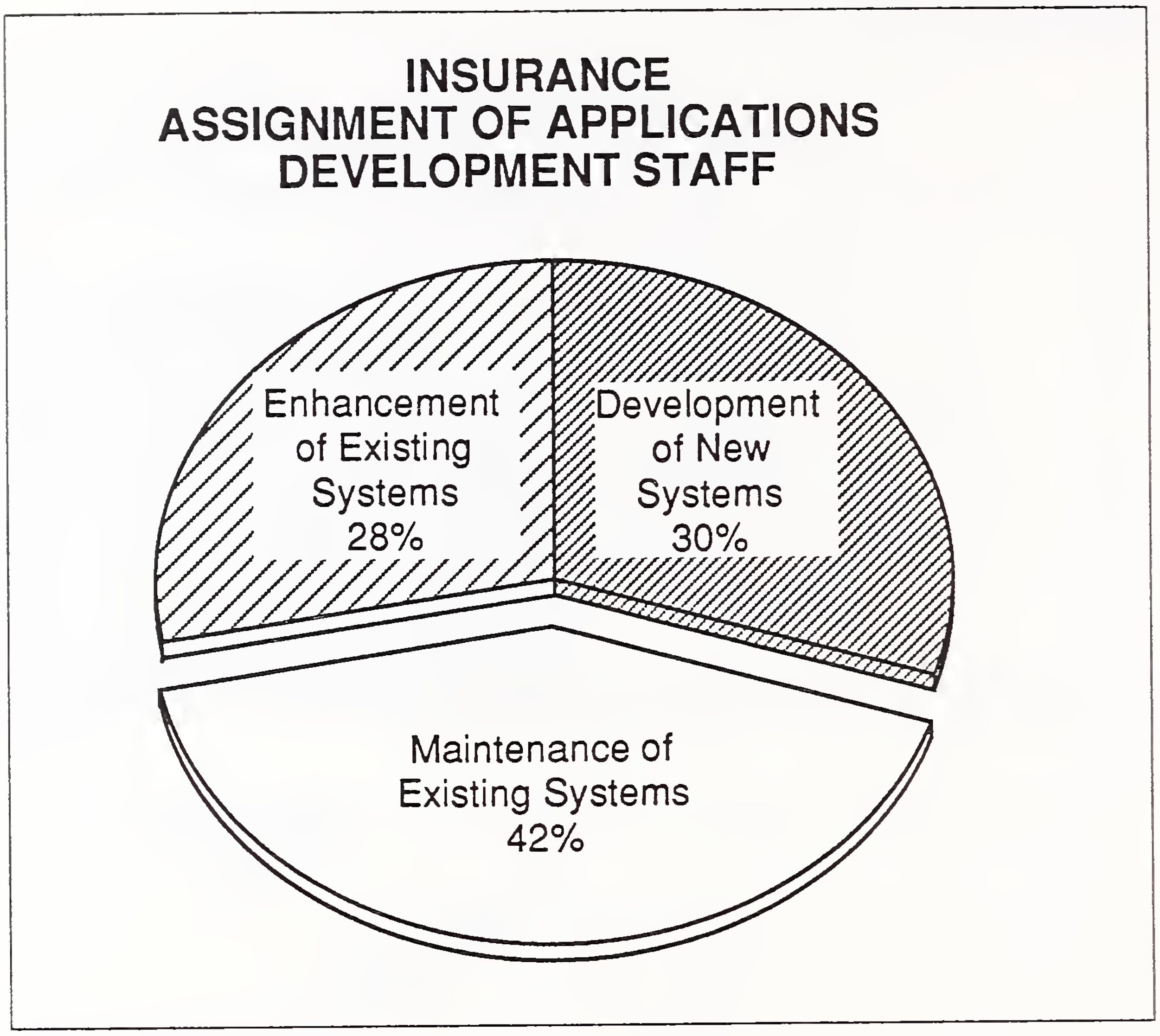
EXHIBIT IV-6

INSURANCE SOURCES OF DEVELOPMENT— ALL NEW MAJOR APPLICATIONS



Cost Range: $60K—$13,000K

EXHIBIT IV-7



C

Budget Analysis

The insurance sector's IS department operating budgets are not primarily dependent on revenue or profits because of the critical nature of IS to the long-term success of the company. In growing companies, new products and applications are routinely justified using business case (ROI) analysis. Stabilized and downsizing companies continue to justify budget decisions using "keeping up with technology" as the primary decision criterion.

Insurance companies' IS budgets are growing, overall, at a faster rate than last year, with 20% in the 50-100% range due to excellent growth. Another 10% are stabilized or actively downsizing, and the rest are growing at 5-15% a year. The average is 9.6%.

Key factors impacting the budget are:

- Continued investment in automation of paperwork for the long-term cost savings
- Investment in new insurance vehicles such as the single-premium whole life, variable annuities, and universal life

- Reworking or complete redevelopment of insurance administration systems to take advantage of new IS technologies and to replace worn-out systems

- Business management systems both for justification and tracking

- Disaster planning

Exhibit IV-8 shows the 1987 budget distribution and projects the 1987-1988 budget growth for the industry's IS costs.

- The largest budget growth areas include personnel, communications, and professional services, reflecting the extensive applications development and support activities.

- The smallest growth area is in overall hardware expenditures. This reflects adequate capacities and good price/performance from the primary vendors.

- Personnel and hardware costs have stayed reasonably stable in the 32% range, and software costs have increased by more than 20%. In the personnel area, 1987 did not show a large percent increase, but hiring is ramping up, and while some companies are stabilized or downsizing, 20% expect a 1988 growth of at least 50%.

Eighty percent of respondents indicated that their budgets would increase over 1986.

Factors contributing to budget increases include:

- Staffing
- Reworked or new administrative systems
- New product development
- Business expansion

Factors contributing to budget decreases include:

- Business downsizing
- Major new hardware not needed; sufficient capacity

EXHIBIT IV-8

INSURANCE
1987 BUDGET DISTRIBUTION AND 1987-1988 CHANGES IN THE INSURANCE SECTOR

Budget Category	1987 Percent of IS Budget	1987-1988 Expected Budget Growth
Personnel Salaries and Fringes	34.1	15.3
Mainframe Processors	14.3	1.3
Minicomputers	1.8	12.6
Microcomputers	5.0	15.1
Mass Storage Devices	5.1	3.0
Other Hardware	5.9	.6
Total Hardware	32.1	2.0
Data Communications	14.1	10.0
Voice Communications	4.2	11.1
Total Communications	18.3	10.3
Professional Services	2.4	2.3
Outside Processing Services	1.1	5.1
External Software	5.5	10.0
Software Maintenance	1.7	7.0
Hardware Maintenance	4.8	10.0
Other	—	9.6
Total	100	9.6

V

Vendor Opportunities

V

Vendor Opportunities

A

Integration

The insurance industry entered computerization early with large mainframes dedicated to standalone functions. Many of these older systems are in need of replacement, and vendors presenting on-line integrated, multi-function systems can achieve penetration here.

B

Artificial Intelligence/ Expert Systems

The repetitive, high-volume nature of many insurance applications, coupled with judgmental needs, lends itself to the use of artificial intelligence to improve both quality and quantity of results. Potential applications now being developed (and some already announced) include:

- Underwriting/risk management
- Claims management
- Adjusting
- Investment management
- Personal financial planning
- Policy customization by field agents
- Medical review analysis

C

Electronic Data Interchange (EDI)

There are 35,000 independent agents in the U.S. At present, 60% of them have some level of automation with much more to come. Each of these agents must transmit data to one or more (usually 2-5) insurance companies. EDI offers dramatic expense and time reduction in moving data between agencies and insurers, and even to the consumers.

The nonprofit Insurance Value-Added Network Services (IVANS) uses IBM's information network to provide connectivity to about 3,000 agents; Aetna and Travelers have established their own private networks. Clearly, there is significant potential remaining, especially as I1R/Accord standards are established for more documents and functions.

D

PC Software for Agencies

PCs are becoming a standard marketing tool for independent agents to more effectively communicate and present alternatives in sales situations. Software which enables agents to be more productive will be well received.

E

Customized Benefit Plans

The trend toward customized individual benefit plans will place great importance on software that facilitates customization analysis, preparation, tracking, and reporting. Single premium, variable annuities and universal life policies are examples of products that can require customization.

F

Development Productivity Tools

Most insurance companies have heavy backlogs for new mainframe-based applications. Tools which can demonstrably improve programmer productivity in such environments will have high priority.

IN-A

Appendix: Forecast Data Base

IN-A

Appendix: Forecast Data Base

This appendix contains the following forecast information, as shown in Exhibits IN-A-1 through IN-A-4.

- Market size by delivery mode for each year from 1986-1992
- Market growth rates for 1986-1992
- Average annual growth rate (AAGR) for each delivery mode for the five-year period 1987-1992
- Market size and growth rates for each sector of the insurance industry, 1986-1992

EXHIBIT A-1

INSURANCE INDUSTRY SECTOR INDUSTRY-SPECIFIC USER EXPENDITURE FORECAST, 1986-1992

Segmentation by Delivery Mode	1986 ($M)	86-87 Growth (Percent)	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)	87-92 AAGR (Percent)
Processing/Network Services									
Remote Comp/Batch	344	15	395	450	509	570	638	707	12
Facility Management	361	10	397	437	480	528	581	639	10
Total Processing Services	705	12	792	887	989	1098	1219	1346	11
Applications Software									
Mainframe/Mini	282	19	335	395	458	527	601	687	15
Micro	109	35	147	191	241	294	353	431	24
Total Applications Software	391	23	482	586	699	821	954	1118	18
Turnkey Systems	179	18	204	233	263	295	327	360	12
Professional Services	894	14	1054	1174	1331	1544	1858	2239	16
Sector Total	2169	17	2532	2880	3282	3758	4358	5063	15

EXHIBIT A-2

INSURANCE INDUSTRY SECTOR LIFE AND HEALTH SEGMENT EXPENDITURE FORECAST, 1986-1992

Segmentation by Delivery Mode	1986 ($M)	86-87 Growth (Percent)	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)	87-92 AAGR (Percent)
Processing/Network Services									
Remote Comp/Batch	165	15	190	214	242	272	306	344	12
Facility Management	329	10	363	400	439	484	533	587	10
Total Processing Services	494	12	553	614	681	756	839	931	11
Applications Software									
Mainframe/Mini	134	16	156	190	221	254	288	330	16
Micro	62	35	84	112	141	168	194	229	23
Total Applications Software	198	23	240	302	362	422	482	559	18
Turnkey Systems	90	14	103	121	138	156	173	189	13
Professional Services	581	18	683	741	824	951	1165	1428	16
Total	1361	18	1579	1778	2005	2285	2659	3107	15

EXHIBIT A-3

INSURANCE INDUSTRY SECTOR PROPERTY/CASUALTY SEGMENT EXPENDITURE FORECAST, 1986-1992

Segmentation by Delivery Mode	1986 ($M)	86-87 Growth (Percent)	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)	87-92 AAGR (Percent)
Processing/Network Services									
Remote Comp/Batch	65	16	73	83	94	107	121	138	13
Facility Management	12	8	13	14	16	17	19	20	10
Total Processing Services	77	12	86	97	110	124	140	158	13
Applications Software									
Mainframe/Mini	97	22	118	136	157	180	206	232	14
Micro	35	35	47	60	77	98	125	161	28
Total Applications Software	132	25	165	196	234	278	331	393	19
Turnkey Systems	25	16	29	33	38	43	49	55	14
Professional Services	224	20	268	316	373	440	519	613	18
Total	458	20	548	642	755	885	1039	1219	17

EXHIBIT A-4

INSURANCE INDUSTRY SECTOR
OTHER INSURANCE SEGMENT
EXPENDITURE FORECAST, 1986-1992

Segmentation by Delivery Mode	1986 ($M)	86-87 Growth (Percent)	1987 ($M)	1988 ($M)	1989 ($M)	1990 ($M)	1991 ($M)	1992 ($M)	87-92 AAGR (Percent)
Processing/Network Services									
Remote Comp/Batch	114	14	132	153	173	191	211	225	11
Facility Management	20	5	21	23	25	27	29	32	9
Total Processing Services	134	12	153	176	198	218	240	257	10
Applications Software									
Mainframe/Mini	51	19	61	69	80	93	107	125	15
Micro	12	33	16	19	23	28	34	41	21
Total Applications Software	63	20	77	88	103	121	141	166	17
Turnkey Systems	64	16	72	79	87	96	105	116	10
Professional Services	89	16	103	117	134	153	174	198	14
Total	350	16	405	460	522	588	660	737	13

IN-B

Appendix: Forecast Reconciliation

IN-B

Appendix: Forecast Reconciliation

This appendix contains the following information:

- Exhibit IN-B-1, which indicates the changes made in this year's forecast as compared to last year's

- Compared to the 1986 report, the 1987 report shows slower growth than expected during 1987 in all delivery-mode categories. Deferred buying decisions, rather than a major structural change, is the primary reason for this reduction.

- For the five-year forecast, turnkey systems growth will slow dramatically, from 20% to 12%. Numerous factors make turnkey systems growth more difficult, including declining hardware prices, reduced discounts from manufacturers to VARS and resellers, and more direct competition for end-user sales from the manufacturer's sales forces.

EXHIBIT B-1

INSURANCE—DATA BASE RECONCILIATION OF MARKET FORECAST BY DELIVERY MODE

Delivery Mode	1986 Market			1991 Market			86-91 AAGR Fcst. in 86 Report (Percent)	87-92 AAGR Fcst. in 87 Report (Percent)
	1986 Forecast ($M)	1987 Report ($M)	Variance of '87 Report (Percent)	1986 Forecast ($M)	1987 Forecast ($M)	Variance of '87 Fcst. (Percent)		
Processing Services								
Remote Computing/ Batch Services	304	344	-12	626	638	-2	13	12
Facility Management	325	361	-10	619	581	7	12	10
Total Processing Services	629	705	-11	1245	1219	6	12	11
Applications Software	311	391	-20	870	954	-9	19	18
Turnkey Systems	164	179	-8	480	327	46	20	12

About INPUT

INPUT provides planning information, analysis and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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